Vol. 29. Parts 1–2. Pp. 1–28. 24 figs. 4th March, 1960

- 31

THE PROCEEDINGS

OF THE

ROYAL ENTOMOLOGICAL SOCIETY OF LONDON

Series B

TAXONOMY

World List abbreviation: *Proc. R. ent. Soc. Lond.* (B)

CONTENTS

	PAGE
HARRISON, R. A. A revision of the genus *Protopiophila* Duda (DIPTERA : PIOPHILIDAE) .	1–6
LEWIS, D. J. The *Simulium neavei* Roubaud complex (DIPTERA : SIMULIIDAE) at Amani in Tanganyika	7–10, 15 figs.
SMIT, F. G. A. M. Records of SIPHONAPTERA from the Pyrenees, with the description of a new species	11–16, 3 figs.
HARRIS, W. VICTOR. Further records of East African Termites—III . . .	17–21, 3 figs.
MACDONALD, W. W. and MATTINGLY, P. F. A new species of *Udaya* from Malaya and a description of the early stages of *U. argyrurus* (Edwards, 1934) (DIPTERA : CULICIDAE) .	22–28, 3 figs.
BOOK NOTICE	28

LONDON

PUBLISHED BY THE SOCIETY AND

SOLD AT ITS ROOMS, 41, QUEEN'S GATE, S.W.7.

Price 9s. 6d.

THE ROYAL ENTOMOLOGICAL SOCIETY OF LONDON

Founded 1833. Incorporated by Royal Charter 1885.

Patron :
HER MAJESTY THE QUEEN.

OFFICERS AND COUNCIL FOR THE SESSION, 1959–1960

Dr. B. P. Uvarov, C.M.G., F.R.S., *President.*
Dr. J. S. Kennedy
Dr. A. M. Massee, O.B.E. } *Vice-Presidents.*
Mr. E. O. Pearson
Dr. N. E. Hickin, *Treasurer.*
Dr. Paul Freeman, *Secretary.*
Mr. W. H. Potts, *Editor.*

Other Members of Council.

Professor D. S. Bertram.
Dr. C. G. Butler.
Dr. A. M. Easton.
Dr. L. G. Higgins.
Dr. B. M. Hobby.
Mr. H. Oldroyd.
Professor O. W. Richards, F.R.S.
Dr. N. Waloff.
Mr. M. J. Way.
Dr. C. B. Williams, F.R.S.

Miss E. Evans, *Registrar.*

Finance and House Committee.
Dr. C. G. Butler (*Chairman*).

Professor D. S. Bertram.
Dr. R. M. Greenslade.
Dr. A. G. Hamilton.
Dr. D. J. Lewis.
Mr. H. L. G. Stroyan

Publication and Library Committee.
Dr. B. M. Hobby (*Chairman*).

Mr. R. G. Davies.
Dr. H. E. Hinton.
Mr. T. G. Howarth.
Mr. G. E. J. Nixon.
Mr. H. Oldroyd.

Conservation (Insect Preservation) Committee.
Dr. A. M. Massee, O.B.E. (*Chairman*).

Mr. R. B. Benson.
Dr. B. M. Hobby.
Mr. T. G. Howarth.
Mr. N. D. Riley, C.B.E.
Mr. F. T. Vallins.

The Executive Officers of the Society are *ex-officio* members of all Committees.

DELEGATES OF THE SOCIETY TO:

1. **British National Committee for Biology** (Royal Society).
   Mr. N. D. Riley, C.B.E., appointed 1955.
   Dr. H. E. Hinton, appointed 1958.
2. **Local Committee of Management of Wicken Fen.**
3. **National Trust for Places of Historic Interest or Natural Beauty.**
   Mr. N. D. Riley, C.B.E., appointed 1955.
4. **New Forest Association.**
   Mr. C. W. Mackworth-Praed, appointed 1948.
5. **New Forest Joint Committee.**
   Lt.-Col. F. C. Fraser, appointed 1949.
6. **Field Studies Council.**
   Dr. W. H. Thorpe, F.R.S., appointed 1944.
7. **Yorkshire Naturalist's Trust, Ltd.**
   Dr. W. D. Hincks, appointed 1946.
8. **The Biological Council.**
   Dr. N. E. Hickin, appointed 1952.
9. **The Parliamentary and Scientific Committee.**
   Dr. N. E. Hickin, appointed 1953.
10. **British Co-ordinating Committee for Nature Conservation.**
    Mr. E. B. Britton, appointed 1954.
11. **Council for Nature.**
    Dr. N. E. Hickin, appointed 1958.

A REVISION OF THE GENUS *PROTOPIOPHILA* DUDA (DIPTERA : PIOPHILIDAE)

By R. A. Harrison

(*Plant Diseases Division, Department of Scientific and Industrial Research, Private Bag, Auckland, New Zealand*)

The group of species in the genus *Piophila* Fallén which possess four dorsocentral bristles was first given a taxonomic designation by Duda (1924), when he erected the subgenus *Protopiophila* to contain them. That such a designation is a legitimate and natural one has not been doubted and subsequent authors have accepted it. Séguy (1934) and Harrison (1959) go so far as to give full generic status to the subgenus. The main factors influencing this action are as follows. The number of dorsocentrals in acalypterate families is an important character and is, in fact, frequently the chief character separating two genera, e.g. *Fenwickia* Malloch and *Aneuria* Malloch. The distinction between *Protopiophila* with four dorsocentrals and *Piophila* with one dorsocentral is, therefore, great. Furthermore, one species of *Protopiophila* is distinct from all other known species in possessing prescutellar bristles. This character is subgeneric in other families, *e.g.* the *Pholadoris* subgenus in *Drosophila*. It is possible that, later, it may be used to designate a subgenus of *Protopiophila*. This action is not proposed here but it does show that a grouping of species can already be recognised within *Protopiophila*. Thus, although at the moment the genus *Piophila* is not a large one, it would appear best to give *Protopiophila* equal status with it.

Three species are already known which can be referred to *Protopiophila* and one of these, *P. australis* Harrison, has only recently been described (Harrison, 1959). Meigen (1838) described what is now the type species of the genus, viz. *Piophila latipes* Meigen. Walker (1860) described *Piophila contecta* from specimens collected at Makessar in the Celebes. Collin (1910) separated *P. latipes* in his key to the genus *Piophila* by the coloration of the head and legs, but did not intimate that he was aware of the four dorsocentrals. Duda (1924) erected the subgenus *Protopiophila* for *latipes* and *contecta* and separated them by the number of humeral bristles present. Malloch (1925) recorded a specimen from Sydney, Australia, as *Piophila latipes*, but, after seeing Duda's paper (Duda, 1924), changed the identification to *Piophila* (*Protopiophila*) *contecta* (Malloch, 1927). He also recorded in the same paper a specimen from Wahroonga, Australia, as *Piophila* (*Protopiophila*) *contecta* but this particular specimen is now a paratype of *P. australis*. Malloch (1931) again switched the identification when he reverted to *latipes* for the Australian specimens, after he had examined American and European examples of *latipes*. He could not distinguish between *latipes* and *contecta* and so recorded the distribution of *latipes* as Europe, America and Australia. Malloch (1930) recorded *Piophila* (*Protopiophila*) *contecta* as occurring in Samoa. These specimens are discussed below. Hennig (1943) discussed the subgenus *Protopiophila* and regarded it as containing only one species, viz. *latipes*. With it he synonymised *contecta* Walker, *ruficornis* Wulp and *flavifacies* Brunetti. A cotype and six other specimens of *P. flavifacies* are in the British Museum (Natural History). They have yellow cheeks and only one dorsocentral, and the synonymy suggested is not substantiated. *P. contecta* is distinct and *P. ruficornis* is synonymous with it. Bezzi (1928) gave full notes of specimens from Fiji and recorded them as *Piophila* (*Protopiophila*) *contecta* Walker. He stated that they were near *latipes* as distinguished by Collin (1910), but were

separated by the narrower frons. He had available specimens from the Philippines for comparison, but in his description of the Fijian specimens he erroneously stated that the mesopleuron was bare. These Fijian specimens which are now in the British Museum have the mesopleuron hairy and have been included in the paratype series of *P. australis*.

Protopiophila Duda

Protopiophila Duda, 1924, *Konowia* **3** : 109.

Front with slightly converging sides ; antennal fossae shallow ; 4 dorsocentrals, anterior one presutural ; wings clear, veins light brown.

Type species : *Protopiophila latipes* (Meigen).

Closely related to *Piophila* but readily separated from it by the presence of four dorsocentral bristles.

Key to Species

1	Prescutellars present	**scutellata** sp. n.
–	Prescutellars absent	2
2	Mesopleuron bare of hairs and dusting	**latipes** (Meigen)
–	Mesopleuron with dusting and/or hairs	3
3	Mesopleuron with dusting and hairs	**australis** Harrison
–	Mesopleuron with dusting and without hairs	**contecta** (Walker)

Protopiophila scutellata sp. n.

A shining dark brown or black species. Body length about 2·75 mm., wing length about 2·5 mm.

Male and female.—Head : arista blackish-brown, light brown basally ; bare. Antenna light brown. Front shining black. Fronto-orbital bristle about equal to postvertical but shorter than verticals and ocellar. Few hairs on front and a row of hairs on orbits. Face brown. Cheeks shining dark brown or black. Hairs on ventral half of cheek. Occiput lightly dusted. Eyes with very few short hairs. Vertical diameter of eye about 4·0 times width of cheek in same axis. Proboscis and palpi dark brown.

Thorax : shining dark brown or black. Propleuron, mesopleuron and ventral section of hypopleuron with greyish-white dusting. Prescutellars present and about two-thirds length of posterior dorsocentrals ; basal scutellars parallel and just under half length of cruciate apicals ; scutellum bare ; 2 humerals ; 1 presutural ; 2 notopleurals ; 1 strong supra-alar ; two postalars ; mesopleuron haired ; 2 approximately equal sternopleurals ; propleural strong.

Legs : yellowish-brown ; fore leg all blackish-brown except fore coxa, trochanter, base and apex of femora and base of tarsus. Second segment of fore tarsus about 1·5 times as long as wide. Fore femur with strong posterodorsal and posteroventral bristles ; mid-tibia with strong ventral apical.

Wings : short stout black costal spines extending just beyond apex of second vein. Wing indices : costal about 4·0 ; fourth vein about 2·2 ; 4*c* about 0·8 ; 5*x* about 1·0.

Halteres light brown basally, light yellowish-brown apically.

Abdomen : glossy black.

Holotype ♂, New Hebrides : Esp. Santo, Second Chain, 4.x.1943 (*Jean Laffoon*) in United States National Museum.

Other records.—Pacific : intercepted at Hawaii from aircraft from south of Hawaii, 1943–44, 3 ♂, 7 ♀, in United States National Museum.

Distribution.—New Hebrides and probably elsewhere in the Pacific.

Remarks.—Distinguished from other members of the genus by having distinct prescutellar bristles.

Protopiophila latipes (Meigen)

Piophila latipes Meigen, 1838, *Syst. Beschr.* **7** : 360. Collin, 1910, *Ent. mon. Mag.* **94** : 177. Malloch, 1925, *Proc. Linn. Soc. N.S.W.* **50** : 316 ; 1927, *Ibid.* **52** : 8 ; 1931, *Ibid.* **56** : 292.
Piophila (*Protopiophila*) *latipes* Meigen : Duda, 1924, *Konowia* **3** : 109, 186. Hennig, 1943, *Flieg. Pal. Reg.* **5** : 35.
Protopiophila latipes (Meigen) : Séguy, 1934, *Faune Fr.* **28** : 77.
Mycetaulus hornigi Cresson, 1919, *Proc. Acad. Philad.* **71** : 193, **syn. nov**

A shining black or reddish-brown species with mainly yellowish-brown legs. Body length 2·0–3·0 mm., wing length about 2·0–3·0 mm.

Male and female.—Head : arista shining brown or dark brown ; rays of pubescence not greater than diameter of basal segments with strong black dorsal pre-apical bristle and small black hairs. Front shining dark brown or black. Ocellars very strong ; single fronto-orbital about two-thirds length of ocellars ; verticals very strong ; postverticals just shorter than verticals ; weak convergent hairs on centre line of front and small reclinate hairs on orbits. Face brown or dark brown. Cheeks brown or dark brown, not shining. Vibrissa strong, strong hairs over most of cheek with 2 or 3 bristles at lower posterior corner. Occiput black with some grey dusting. Eyes with very few short hairs. Vertical diameter of eye about 3·5 times width of cheek in same axis in males and about 5·0 times in females. Proboscis brown ; palpi greyish-brown.

Thorax : shining black, blackish-brown or reddish-brown ; propleuron and part of hypopleuron with heavy greyish-white dusting ; mesopleuron not dusted' No prescutellars ; posterior dorsocentral very strong and about twice length of next anterior bristle, latter about 1·3 times length of 2 anterior bristles. Basal scutellars slightly convergent and just over half length of cruciate apicals. Scutellum bare. Two humerals ; 1 presutural ; 2 notopleurals ; 1 supra-alar ; 2 postalars ; mesopleuron shining and bare of hairs or dusting ; 2 sternopleurals ; 9 small propleurals.

Legs : yellowish-brown ; fore legs with coxa pale yellow, apical half of femur, all tibia and tarsus blackish-brown ; second segment of fore tarsus as long as wide. Fore femur with strong posterodorsal and posteroventral bristles, mid-tibia with strong ventral apical.

Wings : short black stout costal spines extending just beyond apex of second vein. Wing indices : costal about 3·8 ; fourth vein about 2·2 ; 4*c* about 0·8 ; 5*x* about 0·8.

Halteres light brown.

Abdomen : shining black or dark brown.

Holotype, GERMANY : Aachen.

Previous records.—France.

New records.—(United States National Museum specimens unless otherwise stated.) SAARLAND : St. Wendel, no date, 1 ♂, (*O. Duda*), (det. O. Duda). SWITZERLAND : Basle, 30.v.1946, 1 ♀, (*F. Keiser*), (Natural History Museum, Basle), (det. F. Keiser). SWEDEN : Stockholm, 12.vii.1953, 1 ♂, (*C. Sabrosky*), (det. C. Sabrosky). GREECE : Macedonia, Lahanas Hills, Oak forest, no date, 1 ♂, (*Anon.*). UNITED STATES OF AMERICA : Michigan, Detroit, 4.vii.1943, 1 ♂, (*G. Steyskal*), (det. G. Steyskal as *Mycetaulus hornigi* Cresson) : District of Columbia, Washington, –.viii.1911, 1 ♀, (*W. Palmer*) ; on fresh bones, 9.viii.1906, 1 ♂, 2 ♀, (*Anon.*) ; Chain bridge, 8.v.1928, 1 ♀, (*J. M. Aldrich*) : Maryland, Glen Echo, 22.viii.1922, 1 ♂ ; 10.vi.1923, 1 ♂, (*J. R. Malloch*) ; Cabin John, 19.ix.1931, 3 ♀, (*J. M. Aldrich*) : Virginia, Maywood, Alexandria Co., 8.ix.1932, 1 ♀, (*W. L. McAtee*) ; Glencarlyn, 12.vi.1925, 1 ♀, (*J. R. Malloch*) : Connecticut, Stamford, 20.vii.1938, 1 ♂, 1 ex., (*S. W. Bromley*) : Tennessee, U.T. Farm, Knox. Co., 11.vi.1951, 1 ♂, 3 ♀, (*H. B. Read*), (det. C. Sabrosky) : Wisconsin, Pewankee, 15.vi.1951, 1 ♂, (*W. E. Brown*).

Specimens examined : 10 ♂, 13 ♀ and 1 example (not sexed).

Distribution.—Europe, North America.

Remarks.—There is variation in size and colour of specimens in this genus. Most specimens approach 3·0 mm. and are almost black, but some are smaller and some much lighter in colour. Duda (1924) separated *latipes* from *contecta* by the number of humeral bristles, the former species having one and the latter two. This

is an unsatisfactory character and, as all twenty-four specimens of *latipes* examined on the present occasion (including one determined by Duda) have two humerals, the presence of only one must be regarded as a rare aberration. *P. latipes* is most readily separated from all other species in the genus by having the mesopleuron completely bare of hairs and of dusting. It would appear to be closest to *P. contecta* and, besides the bare mesopleuron, differs from that species in having a pubescent arista and the third antennal segment darker than the rest of the antenna. Sabrosky (*private communication*) states that Steyskal considered that *Mycetaulus hornigi* Cresson was synonymous with *P. latipes* although the synonymy has not been published.

Protopiophila australis Harrison

Protopiophila australis Harrison, 1959, *The Acalypterate Diptera of New Zealand* : 173 (*Bull. N.Z. Dep. Sci. industr. Res.* **128**. Wellington. 382 pp.)

Although this species has been recently described, the description is repeated here for the sake of completeness.

Shining blackish-brown, with yellowish-brown mid and hind legs. Body length about 3·0 mm., wing length about 2·75 mm.

Male and female.—Head : arista brown ; pubescence of a few scattered small hairs much less than diameter of arista. Antenna yellowish-brown ; basal segment brown. Front longer than wide, glossy black, slightly raised anteriorly. One fronto-orbital just shorter than the divergent postverticals and shorter than verticals and ocellars ; few scattered black hairs over surface except the raised anterior ridge, and row of hairs on orbits. Face whitish-grey with shining darker brown bands on margin of antennal fossae. Cheeks shining dark brown. Vibrissa strong but no clearly differentiated bristles at lower posterior corner of cheek ; hairs on ventral half of cheek. Occiput dark brown. Eyes with few very short fine hairs. Vertical diameter of eye about 3·5 times width of cheek in same axis. Proboscis shining dark brown ; palpi yellowish-brown, broad and long.

Thorax : shining dark brown ; greyish-white tomentum on dorsal margin of mesopleuron, surrounding anterior spiracle and over most of propleuron, and dorsal to hind coxa. No acrostichals ; basal scutellars parallel, or divergent and about two-thirds length of convergent apicals ; scutellum bare ; 2 humerals ; 1 presutural ; 2 notopleurals ; 1 supra-alar ; 2 postalars ; 2 equal posterior sternopleurals ; mesopleuron haired ; 1 strong and 1 very weak propleural ; prosternum bare.

Legs : fore legs blackish-brown except yellowish-brown coxa, trochanter, base and apex of femur and base of tibia ; white pulvilli ; other legs all yellowish-brown. Second segment of fore tarsus about 1·5 times as long as wide. Fore femur with posterodorsal and posteroventral bristles ; apicals only on mid-tibia.

Wings : short black stout costal spines ending just beyond apex of second vein. Wing indices : costal about 4·3–4·7 ; fourth vein about 2·2–2·7 ; 4*c* about 0·9 ; 5*x* about 0·8–1·0.

Halteres light brown basally, light yellowish-brown apically.

Abdomen : glossy blackish-brown ; longest hairs and bristles on the posterior segments.

Holotype ♂, New Zealand : Waitakere Ranges, Titirangi, *ex* light trap, 18.ii.1953, (*C. R. Thomas*), in Plant Diseases Division, D.S.I.R., Auckland, New Zealand.

Previous records.—New Zealand, Australia, Fiji. (10 ♂, 5 ♀ and 2 paratypes (not sexed).)

Distribution.—New Zealand, Australia and Fiji.

Remarks.—Closest to *P. contecta* and separated from it by having hairs on the mesopleuron.

Protopiophila contecta (Walker)

Piophila contecta Walker, 1860, *J. Linn. Soc. Lond.* **4** : 167. Malloch, 1927, *Proc. Linn. Soc. N.S.W.* **52** : 8 ; 1930, *Insects of Samoa, VI* (6) : 251 ; 1931, *Proc. Linn. Soc. N.S.W.* **56** : 292.

Piophila (Protopiophila) contecta Walker : Duda, 1924, *Konowia* **3** : 109 and 197. Bezzi, 1928, *Dipt. Brach. Ath. Fiji Is.*: 119. Hennig, 1943, *Flieg. Pal. Reg.* **5** : 35.
Protopiophila contecta (Walker) : Séguy, 1934, *Faune Fr.* **28** : 77.
Piophila ruficornis Wulp, 1871, *Dipt. Sumatra Exp.*: 49.

A shining black or blackish-brown species with yellowish-brown legs. Body length about 3·0–3·5 mm., wing length about 3·0–3·5 mm.

Male and female.—Head : arista dark brown, bare, or with only minute pubescence. Antenna all light brown ; second segment with small but distinct pre-apical dorsal bristle. Front black. Ocellars strong ; single fronto-orbital about equal to postverticals ; verticals strong. Few fine hairs on front and on orbits. Face mostly black or blackish-brown. Vibrissa strong, fine long bristles at lower posterior angle of cheek. Occiput black. Eyes with very few fine short hairs. Vertical diameter of eye 3 to 4 times width of cheek in same axis. Proboscis dark brown ; palpi light reddish-brown or yellowish-brown.

Thorax : black, mostly shining black but with a very light dusting of pollen over some surfaces, particularly the mesonotum ; propleuron and dorsal section of mesopleuron and ventral portion of hypopleuron with thick distinct matt of grey pollen. No prescutellars ; posterior dorsocentral about 1·5–1·75 times length of the 3 anterior bristles ; basal scutellars parallel and about half length of convergent apicals ; scutellum bare ; 2 humerals ; 1 presutural ; 2 notopleurals ; 1 strong supra-alar ; 2 sternopleurals ; 1 small propleural bristle.

Legs yellowish-brown ; fore coxa not as shining as other coxae ; apical two-thirds of fore femur except extreme apex, all fore tibia and fore tarsus, blackish-brown. Fore femur with posterodorsal and posteroventral bristles and mid-tibia with strong ventral apical.

Wings : small black costal spines extending just beyond apex of second vein. Wing indices : costal about 4·1 ; fourth vein about 2·5 ; 4*c* about 0·8 ; 5*x* about 0·9.

Halteres pale yellow.

Abdomen : shining black.

Holotype ♀, CELEBES : Makessar, no date (*A. R. Wallace*), in British Museum (Nat. Hist.).

Previous records.—Samoa, Sumatra, New Guinea, Formosa.

New records.—(All United States National Museum specimens) : OKINAWA : 23.vi.1945, 1 ♂, (*F. N. Young*) ; Chizuka, July to September, 3 ♀, (*G. E. Bohart and C. L. Harnage*). PHILIPPINE ISLANDS : Sama, 7.x.1945, 1 ♀, (*F. F. Bibby*) : Palawan, Puerto Princessa, 1 ♂, (*R. C. McGregor*) : Manila, 1 ♂, (*R. C. McGregor*).

Specimens examined.—Holotype, 3 ♂, 4 ♀ and 6 examples (not sexed).

Distribution.—Samoa, Celebes, Philippines, Okinawa, Sumatra, New Guinea, Formosa.

Remarks.—Usually a larger species than *P. latipes* but most easily separated from it by the presence of dusting on the mesopleuron. Other characters of *P. contecta* which separate the two species are the bare arista and the even coloration of the antenna. Duda (1924) did not mention the dusting on the mesopleuron and by describing it as shining black leads one to suspect the absence of any dusting. However, the holotype and all specimens examined show this dusting, and when searched for it is unmistakable.

DISTRIBUTION

P. latipes can now reasonably be regarded as a Holarctic species as all records of its occurrence outside this region are in error.

P. contecta, as shown above, occurs in the Orient and the Pacific and in future may be found widespread over this area.

P. scutellata is at present known only from the Pacific, while *P. australis* is found in New Zealand, Australia and Fiji.

The occurrence of *P. contecta* in Samoa and not (as yet) in Fiji is hard to explain, but the apparent discontinuity of its distribution may well be due to the paucity of collections.

Acknowledgments

I am indebted to C. W. Sabrosky of the United States National Museum for indicating to me the need for some revision in *Protopiophila*, and for much valuable assistance during this study. Specimens have been received on loan from the United States National Museum and the Natural History Museum, Basle, Switzerland. The collections of the British Museum (Natural History) were freely available to me during my stay in England.

References

Bezzi, M., 1928, *Diptera, Brachycera and Athericera of the Fiji Islands.* British Museum (Natural History), London. 220 pp.

Collin, J., 1910, Additions and corrections to the British list of Muscidae Acalyptratae. *Ent. mon. Mag.* **46** : 169–78.

Duda, O., 1924, Revision der europäischen u. grönländischen sowie einiger südostasiat. Arten der Gattung *Piophila* Fallén (Dipteren). *Konowia* **3** : 97–113, 153–203.

Harrison, R. A., 1959, Acalypterate Diptera of New Zealand. *Bull. N.Z. Dep. Sci. industr. Res.* **128**. Wellington, N.Z. 382 pp.

Hennig, W., 1943, *In* Lindner, E. *Die Fliegen der Palaearktischen Region.* (Piophilidae). 52 pp.

Malloch, J. R., 1925, Notes on Australian Diptera, vii. *Proc. Linn. Soc. N.S.W.* **50** : 311–40.

—— 1927, Notes on Australian Diptera, x. *Ibid.* **52** : 1–16.

—— 1930, Lonchaeidae, Chloropidae, Piophilidae. *Insects of Samoa*, VI (6) : 239–51.

—— 1931, Notes on Australian Diptera, 29. *Proc. Linn. Soc. N.S.W.* **56** : 292–8.

Meigen, J. W., 1838, *Syst. Beschr.* **7** : xii + 434 pp.

Séguy, E., 1934, *Faune de France* **28**. (*Diptères Brachycères.*) Paris. 832 pp.

Walker, F., 1860, Catalogue of the Dipterous Insects collected at Makessar in the Celebes by Mr. A. R. Wallace with descriptions of New Species. *J. Linn. Soc. Lond.* **4** : 90–172.

THE *SIMULIUM NEAVEI* ROUBAUD COMPLEX (DIPTERA : SIMULIIDAE) AT AMANI IN TANGANYIKA

By D. J. Lewis*

(*British Museum (Natural History)*)

The *Simulium neavei* Roubaud complex has been studied by Freeman and de Meillon (1953) and previous writers, and reviewed by de Meillon (1957) and Freeman (1957); the Kenya forms have been discussed by McMahon (1957), and additional records have been made by Grenier and Ovazza (1956) and by Ovazza (1957). The complex is of considerable interest because it includes several local mountain forest forms, because the larvae and pupae attach themselves to certain freshwater crabs, and because one species, at least, is an important vector of human onchocerciasis.

It is difficult to classify the members of the complex. In the case of each one it is desirable to consider structural details of the larvae, pupae, females and males, and breeding places, larval habits and blood-sucking preferences, but often the material presented for identification consists only of a few females taken while biting man—and probably partly denuded of their scales. Collecting the early stages involves a study in itself because it must start with an investigation of the crab fauna.

Three species are now recognised in East Africa, *S. neavei* Roubaud, *S. nyasalandicum* de Meillon and *S. woodi* de Meillon, but the specimens from the type localities of *S. nyasalandicum* and *S. woodi* are females only. Specimens of members of the complex have been obtained in various parts of Africa but some cannot be identified with certainty, either because the material is insufficient or because not enough is yet known about *S. nyasalandicum*, *S. woodi* and certain other forms, or for both reasons.

Two forms occur at Amani and are described below. It is proposed to name them and consider fully their relation to other members of the complex when *S. nyasalandicum* and *S. woodi* can be investigated in their type areas. The Amani forms are here called for convenience the Amani banded and the Amani unbanded forms, according to the presence or absence of a conspicuous but rather variable dark band on the abdomen. The two forms do not correspond exactly with any of those which have been carefully studied hitherto in East Africa—*S. neavei* and the Kenya ones now known as *S. nyasalandicum* and *S. woodi*—but the unbanded one may be related to "*S. renauxi*", a form of *S. neavei* in the Belgian Congo, and the banded form to *S. woodi*. Biological studies of the Amani forms will be reported elsewhere.

Wings were measured from the radio-medial cross vein to the tip, and the length, from the base of the costa to the tip (fig. 10), was calculated from a ratio observed in a sample.

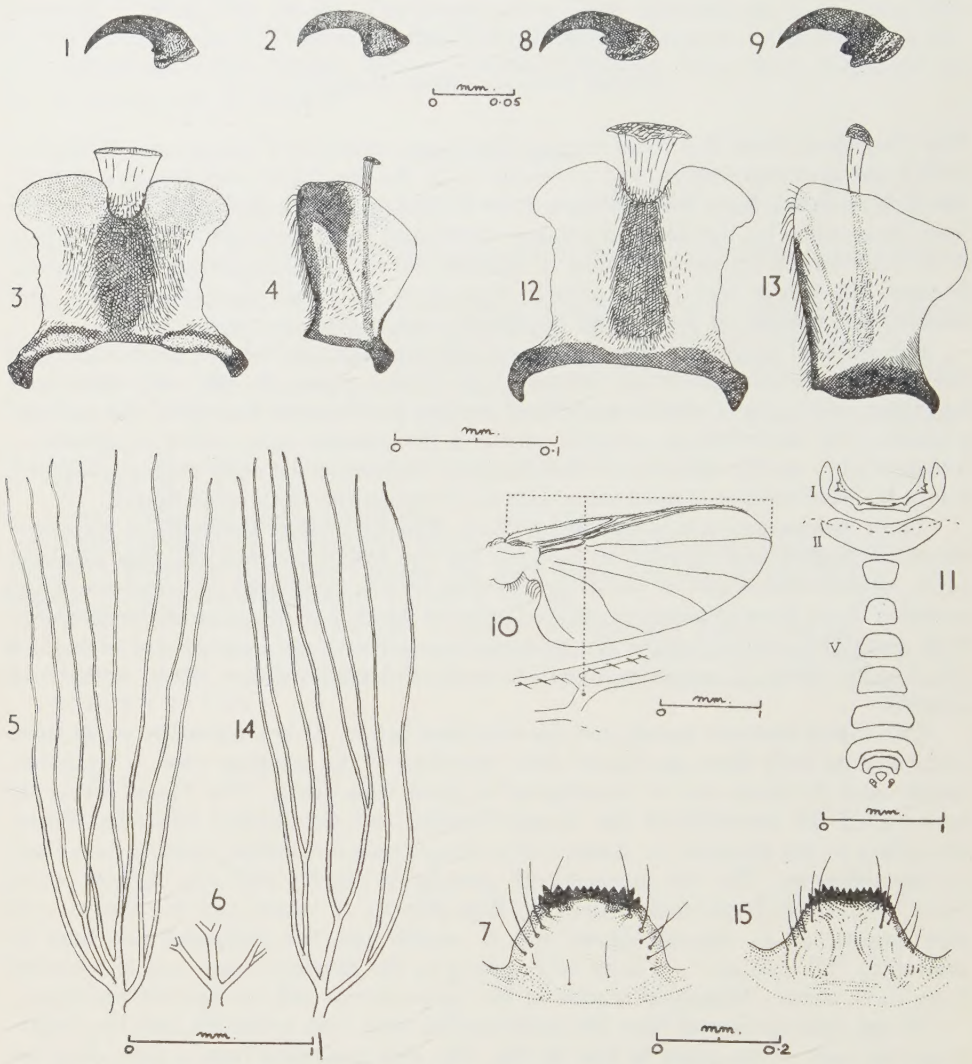
The specimens on which the following descriptions are based have been deposited in the British Museum (Natural History).

The Amani unbanded form (Figs. 1–7)

Female.—Differs from the *renauxi* form of *S. neavei* in having a pale band on the hind basitarsus. *Wing length* 2·5 mm. (2·4–2·6, n = 4). *Head*: frons and vertex grey, with pale brassy scales; occiput with some dark scales at the centre; first two antennal segments and part of third pale, the rest dark. *Thorax*: mesonotum with brassy scales very pale at margins; scutellum with long pale scales; postnotum bare. Femora pale, with dark distal tips, with pale

* Scientific staff, Medical Research Council. A grant from the Colonial Development and Welfare Fund, awarded by the Colonial Office, helped to finance this work.

scales on basal half; tibiae pale at centre and dark at ends, basal halves with pale scales; first and second tarsi dark, the third basitarsus mainly pale, with pale scales on basal half; tarsal claws with very small teeth. *Abdomen*: second tergite very broad; abdomen covered with pale brassy scales interspersed with dark scales. (In some specimens most of the abdominal scales



FIGS. 1–15.—(1)–(7) *Simulium neavei* complex, Amani unbanded form. ♀: (1) claw of hind tarsus; (2) the same with unusually small tooth. ♂: (3) and (4) ventral and lateral views of ventral plate. Pupa: (5) and (6) gill. Larva: (7) submentum. (8)–(15) *S. neavei* complex, Amani banded form. ♀: (8) hind tarsal claw; (9) the same with unusually large tooth; (10) wing showing method of measurement; (11) abdominal tergites. ♂: (12) and (13) ventral plate. Pupa: (14) gill. Larva: (15) submentum.

may be lost, or enough may be missing from the third and fourth terga to reveal the integument as a dark band, rather like that of *S. woodi*, which must be very closely examined to determine its nature.) Dark hairs, best seen in microscopic preparations of newly emerged flies, on fifth to ninth terga. *Terminalia*: as in *S. neavei*.

Male.—Very similar to that of the *renauxi* form of *S. neavei*. *Head*: frons grey and hair tuft pale; some, at least, of occipital hairs black. *Thorax*: mesonotum black, mainly covered with

golden scales, but with narrow anterior and broad lateral and posterior bands of pale scales; scutellum brown, hairs of posterior fringe yellow, the lateral ones with dark bases. Scales on femora tibiae and tarsi black ; femora pale with dark tips, first tibia with middle third pale, second and third tibia mainly pale with dark basal and apical bands ; tarsi dark except for the enlarged third basitarsus and base of second hind tarsal segment. *Abdomen* : black except for silvery patches on segments 2, 5 and 6 ; scales on first 2 segments mainly pale, on 3 mainly black, on 4 usually all black, on 5 and 6 largely pale, and those on 6 and 8 black. *Terminalia* : styles as in *S. neavei* ; ventral plate with broad notch, posterior margin of plate usually grey, patch of hairs rather broad.

Pupa.—Very like that of *S. neavei.* Head and thorax : smooth, trichomes simple, basal part of central branch of gill filaments 2·5 to 4 times as long as wide. Four small dorsal hooks on each side of second abdominal segment, usually with very faint brown areas at their bases. *Cocoon* : loosely woven from pale threads, without well defined rim, the ventral part produced anteriorly.

Larva.—Very like that of *S. neavei. Submentum* : with 13 anterior black teeth on an arc convex anteriorly ; deep pigmentation usually seen near bases of outer teeth ; sides of submentum convex, with about 3 to 6 small blunt or pointed teeth on anterior half ; most of the general surface smooth, bases of ventro-lateral hairs marked by conspicuous pale areas.

Specimens examined.—All from or taken within 4 miles of Amani: 14.xii.17, biting mule (Freeman and de Meillon, 1953) (recorded as *S. nyasalandicum* : probably the Amani unbanded form) 1 ♀ ; xii.54 and i.55 (*M. T. Gillies*), 2 ♀, 1 ♂, with pupal skins ; x and xi.58 (*D. J. Lewis*), 18 bred ♀, 13 bred ♂, 6 pupae, 46 pupal skins, 118 larvae.

Habits.—Not known to suck blood unless above mentioned female taken on a mule was this form.

The Amani banded form (Figs. 8–15)

Female.—Very similar to *S. woodi*, but, unlike the Kenya form, often bites man ; usually rather darker than the unbanded form. *Wing length* : 2·7 mm. (2·4–3·0, n = 357). *Head* : as in the unbanded form. *Thorax* : mesonotum, scutellum and postnotum as in the unbanded form except that the central mesonotal scales are usually golden rather than brassy. Femora brown when seen by transmitted light, with black tips, scales pale on basal half ; tibiae brown or yellow near centre and dark at ends, with pale scales on basal half ; first and second tarsi dark, third basitarsus with basal half pale and clothed with pale scales ; tarsal claws with conspicuous teeth. *Abdomen* : second tergite very broad ; abdomen covered with a mixture of golden and dark scales ; those on segment 4 usually all or mostly black ; dark hairs on third to ninth terga. *Terminalia* : as in *S. neavei.*

Male.—Very like the unbanded form. Fourth abdominal segment bearing black scales, patch of hairs on ventral plate usually narrow and posterior border of plate generally yellow.

Pupa.—Very like that of unbanded form but gill filaments branching further from the base (basal section of central branch 7 to 10 times as long as wide) and dorsal hooks on second abdominal segment often very fine and without any pigment at their bases. *Cocoon* : like that of unbanded form.

Larva.—Submentum : anterior teeth appearing different from those of unbanded form owing to rather angular shape of antero-lateral part of submentum and to the fact that pigmented ridges obscure pigmentation at bases of outer large teeth ; sides of submentum straight, with about 8 to 10 small teeth which extend into basal half ; ventral surface usually with conspicuous ridges, pale spots at bases of ventro-lateral hairs inconspicuous.

Specimens examined.—21.ix.51, biting man (*J. P. McMahon*), recorded by Freeman and de Meillon as *S. woodi*, 1 ♀ ; xii.54 (*M. T. G.*), 5 ♀ biting man, 5 bred ♂ and 2 bred ♀ with pupal skins ; x and xi.58 (*D. J. L.*), 55 caught ♀, 3 bred ♀, 7 bred ♂, 1 pupa, 14 pupal skins, 72 larvae.

Habits.—Larvae were commoner than those of the unbanded form in small high streams, but the larvae and pupae of both forms are found on the same parts of the crabs, mainly on the sides. The females are common, but not abundant, and bite man.

Summary

Two members of the *Simulium neavei* Roubaud complex from Amani, Tanganyika, are described. The naming of them and a full discussion of their affinities are deferred until more is known of the complex as a whole.

Acknowledgments

My thanks are due to Dr. D. Bagster Wilson and Dr. M. T. Gillies for providing facilities for collecting *Simulium* ; to Dr. Paul Freeman for advice on classification ; and to Mr. J. P. McMahon for information about Kenya members of the *S. neavei* complex.

References

De Meillon, B., 1957, Bionomics of the vectors of onchocerciasis in the Ethiopian geographical region. *Bull. Wld. Hlth. Org.* **16** : 509–522.

Freeman, P., 1957, The problem of the *Simulium neavei* complex. *Ibid.* **16** : 669–670.

—— and De Meillon, B., 1953, *Simuliidae of the Ethiopian Region*. London : British Museum (Natural History).

Grenier, P., and Ovazza, M., 1956, Contribution à l'étude des Diptères vulnérants de l'empire d'Éthiopie II. Simuliidae. Simulies et onchocercose. *Bull. Soc. Path. exot.* **49** : 182–196.

McMahon, J. P., 1957, Notes on the *Simulium neavei* group of Simuliidae with particular reference to *S. nyasalandicum* and *S. woodi*. *Bull. ent. Res.* **48** : 607–617.

Ovazza, M., 1957, Presence de simulies du "groupe *neavei* " au Moyen Congo, Afrique Equatoriale Française. *Bull. Soc. Path. exot.* **50** : 537–539.

RECORDS OF SIPHONAPTERA FROM THE PYRENEES, WITH THE DESCRIPTION OF A NEW SPECIES

By F. G. A. M. Smit

(*British Museum (Natural History), The Zoological Museum, Tring, Herts.*)

The flea-fauna of southern Europe being very insufficiently known, collecting in the south of France, the Iberian peninsula and in Italy is bound to result in records which are worth publishing.

A small number of fleas was recently collected by Messrs. K. East and G. C. Phillips on the Spanish side of the Pyrenees and, though they obtained only representatives of four common species, the record of one of them (*Hystrichopsylla talpae* (Curtis)) is of particular interest. I am indebted to these gentlemen for their enterprise in collecting fleas while in the Pyrenees and for their generosity in presenting the specimens to the British Museum collection of fleas at Tring.

The late Dr. Karl Jordan collected fleas in Andorra and the adjacent part of France in May–July, 1950, and obtained 225 specimens of nine different species, one of which is new to science. At the time Dr. Jordan had too much on hand to write up the full particulars of his material, and he used only the records of *Leptopsylla taschenbergi amitina* Jordan and Rothschild for his 1951 paper. Subsequently he invited me to describe the new species and to record the other fleas which he collected.

The list below is therefore based on the data from the 225 specimens collected by Dr. Jordan and from the thirteen specimens collected by Messrs. East and Phillips.

List of Collecting-localities

l'Hospitalet (near Andorra), 1450–1500 m., Ariège, France (collector *K. Jordan*).

Las Bordas—Trédos region, Val d'Aran, Pyrenees, Spain (collectors *K. East* and *G. C. Phillips*).

Las Escaldas, 1050–1100 m., Andorra (collector *K. Jordan*).

Porté, 1580 m., Pyrénées-Orientales, France (collector *K. Jordan*).

Tarascon (sur Ariège), 490 m., Ariège, France (collector *K. Jordan*).

Pulex irritans L., 1758

l'Hospitalet, from *Homo sapiens*, vi.1950 : 1 ♀.

The presence or absence of the human flea in human habitations, at least in urban districts, is an indication of the standard of living. The progress of civilization has been a disadvantage to this flea, and it will eventually have to rely more and more on wild carnivores, the larger species of which (such as the badger) are important natural hosts of the human flea.

Leptopsylla taschenbergi amitina Jordan and Rothschild, 1914

Las Escaldas, from *Apodemus sylvaticus callipides*, 28.vi.1950 : 1 ♂, 1 ♀; 29.vi.1950 : 1 ♂; 1.vii.1950 : 1 ♀; 2.vii.1950 : 1 ♀; 4.vii.1950 : 1 ♂, 1 ♀; 9.vii.1950 : 2 ♂, 2 ♀; 14.vii.1950 : 1 ♀.

Porté, from *Apodemus sylvaticus callipides*, 23.vi.1950 : 1 ♂.

Tarascon, from *Apodemus sylvaticus callipides*, 23.v.1950 : 7 ♂, 15 ♀ ; 24.v.1950 : 12 ♂, 11 ♀ ; 25.v.1950 : 7 ♂, 8 ♀ ; 27.v.1950 : 1 ♂, 1 ♀ ; 29.v.1950 : 2 ♂, 1 ♀ ; 1.vi.1950 : 8 ♂, 9 ♀ ; 3.vi.1950 : 1 ♀ ; 4.vi.1950 : 1 ♂, 1 ♀ ; 5.vi.1950: 1 ♂, 1 ♀ ; from *Mus* sp., 3.vi.1950 : 1 ♀.

The polytypic species *Leptopsylla taschenbergi* is associated with members of the genus *Apodemus* ; *L. t. amitina* is known to occur also in northern Spain (Dunnet, 1955) and Algeria (Jordan, 1951). Gil Collado (1948) recorded *L. taschenbergi* from Cercedilla (36 miles NW. of Madrid, on the southern side of the Sierra de Guadarrama) and there is little doubt that his material also belongs to subspecies *amitina*.

The genus *Triainapsylla*, erected by Rosický (1957) for *Leptopsylla taschenbergi* and two other polytypic species (*L. aethiopica* and *L. algira*) which also have a genal ctenidium of three spines, can at most be regarded as a subgenus of *Leptopsylla*, but in that case one might also place the species with six genal spines (*L. putoraki* and *L. sexdentata*) in a separate subgenus, leaving the species with four genal spines (*L. nana*, *L. sciurobia*, *L. segnis* and *L. sicistae*) in the nominate subgenus. It should be noted that the genus *Peromyscopsylla*, which contains species closely related to *Leptopsylla*, is not merely characterised by the presence of only two spines in the genal ctenidium, but also by the phylogenetically more important absence of the central tuber of the head (this is present in species of *Leptopsylla* with three, four or six genal spines). For the present I will treat the name *Triainapsylla* as a synonym of *Leptopsylla*.

Monopsyllus sciurorum sciurorum (Schrank, 1803)

l'Hospitalet, from *Eliomys quercinus*, 19.vi.1950 : 1 ♀.

Las Bordas—Trédos region, Val d'Aran, from *Eliomys quercinus*, viii–ix.1958 : 4 ♂, 3 ♀.

A very common flea of squirrels, occurring throughout Europe (to the Ural and Caucasus) and in Asia Minor. The flea being a parasite of a host with arboreal habits, it is also regularly encountered on dormice which live in a habitat not dissimilar from that of squirrels. Specimens from *Glis glis* from the Sierra de Aralar, Navarra, Spain, were described as *M. sciurorum bolivari* Gil Collado, 1948, but this name was placed as a synonym by Smit (1957 : 71).

Myoxopsylla laverani (Rothschild, 1911)

l'Hospitalet, from *Eliomys quercinus*, 9.vi.1950 : 11 ♀ ; 12.vi.1950 : 3 ♂, 3 ♀ ; 14.vi.1950 : 2 ♀ ; 19.vi.1950 : 5 ♂, 15 ♀ ; 21.vi.1950 : 3 ♂, 3 ♀.

Las Escaldas, from *Eliomys quercinus*, 11.vii.1950 : 1 ♂, 1 ♀.

Las Bordas—Trédos region, Val d'Aran, from *Eliomys quercinus*, viii–ix.1958 : 1 ♀.

A specific parasite of dormice, especially common on *Eliomys quercinus*. The flea has a more or less Mediterranean distribution (Iberian peninsula, France, Sardinia, Switzerland, southern Germany, south-east Belgium, Yugoslavia and Algeria).

Nosopsyllus fasciatus (Bosc, 1800)

Tarascon, from *Apodemus sylvaticus callipides*, 23.v.1950 : 1 ♂ : 27.v.1950 : 2 ♂, 1 ♀.

This very common cosmopolitan rat-flea occurs principally on *Rattus* spp. ; secondary hosts (several of which may be only temporary) on which it occurs not

uncommonly in Europe include the wood-mouse (*Apodemus sylvaticus*), the house-mouse (*Mus musculus*) and voles (Microtinae).

Hystrichopsylla talpae talpae (Curtis, 1826)

South-west shore of Est. Llosa, 5 miles south-east of Trédos, 2200 m., Val d'Aran, from *Microtus arvalis*, viii–ix.1958 : 2 ♂, 2 ♀.

This record from the Spanish side of the Pyrenees is the first from Spain and is also of special interest for other reasons. Peus and Smit (1957 : 393) pointed out that *H. talpae* apparently does not occur in the south and south-west of France or in Spain. Unfortunately, however, they overlooked a record of *H. talpae* (1 ♀, doubtless belonging to the nominate subspecies) from the Col de Puymorens (nr. Porté), 1900 m., Pyrénées-Orientales (Rothschild, 1911 : 215). The new record extends the known distribution of the species considerably, and the Val d'Aran is now the most southern locality in Europe from which the nominate subspecies is known, the females recorded by Peus (1958 : 147) from Greece being probably ssp. *orientalis* Smit.

The nominate subspecies occurs in the north, centre and east of France (and throughout western and part of central Europe). It is, of course, possible that the apparent absence of the species from the south-west of France is genuine and that there are only relict-populations in the colder Pyrenees ; it should be noted that the specimens mentioned above were collected at altitudes of 2200 and 1900 m. respectively, and that Peus found indications that the species may be confined to high altitudes in Greece. The climate of the greater part of the Iberian peninsula may not be suitable for fleas of this genus ; all the known species of *Hystrichopsylla* occur in the Holarctic Region and nearly all in temperate areas, while the single species found in the Nearctic part of Mexico occurs only at very high altitudes.

Typhloceras poppei Wagner, 1903

Tarascon, from *Apodemus sylvaticus callipides*, 24.v.1950 : 1 ♀.

This specific parasite of *Apodemus* is seldom collected in considerable numbers, though it cannot be called a rare flea. Western and central Europe (to Poland and Czechoslovakia in the east, Greece in the south-east), and Algeria.

Palaeopsylla minor (Dale, 1878)

Tarascon, from *Talpa europaea*, 24.v.1950 : 3 ♂, 5 ♀.

A common flea of the mole, occurring in western and central Europe.

Ctenophthalmus (*Ctenophthalmus*) *arvernus* Jordan, 1931

Tarascon, from *Apodemus sylvaticus callipides*, 24.v.1950 : 1 ♀ ; 25.v.1950 : 1 ♀; 29.v.1950 : 2 ♂, 4 ♀ ; 1.vi.1950 : 1 ♂, 5 ♀ ; 3.vi.1950 : 1 ♀ ; from *Mus* sp. 31.v.1950 : 3 ♂ ; 3.vi.1950 : 1 ♂, 1 ♀ ; from a vole, 27.v.1950 : 2 ♂, 2 ♀.

l'Hospitalet, from *Apodemus sylvaticus callipides*, 14.vi.1950 : 3 ♀ ; 17.vi.1950 : 5 ♂, 3 ♀ ; 18.vi.1950 : 1 ♀ ; from *Eliomys quercinus*, 19.vi.1950 : 1 ♂.

Porté, from *Apodemus sylvaticus callipides*, 23.vi.1950 : 1 ♂.

Las Escaldas, from *Apodemus sylvaticus callipides*, 28.vi.1950 : 1 ♂.

Las Bordas—Trédos region, Val d'Aran, from *Sorex araneus*, viii–ix.1958 : 1 ♂.

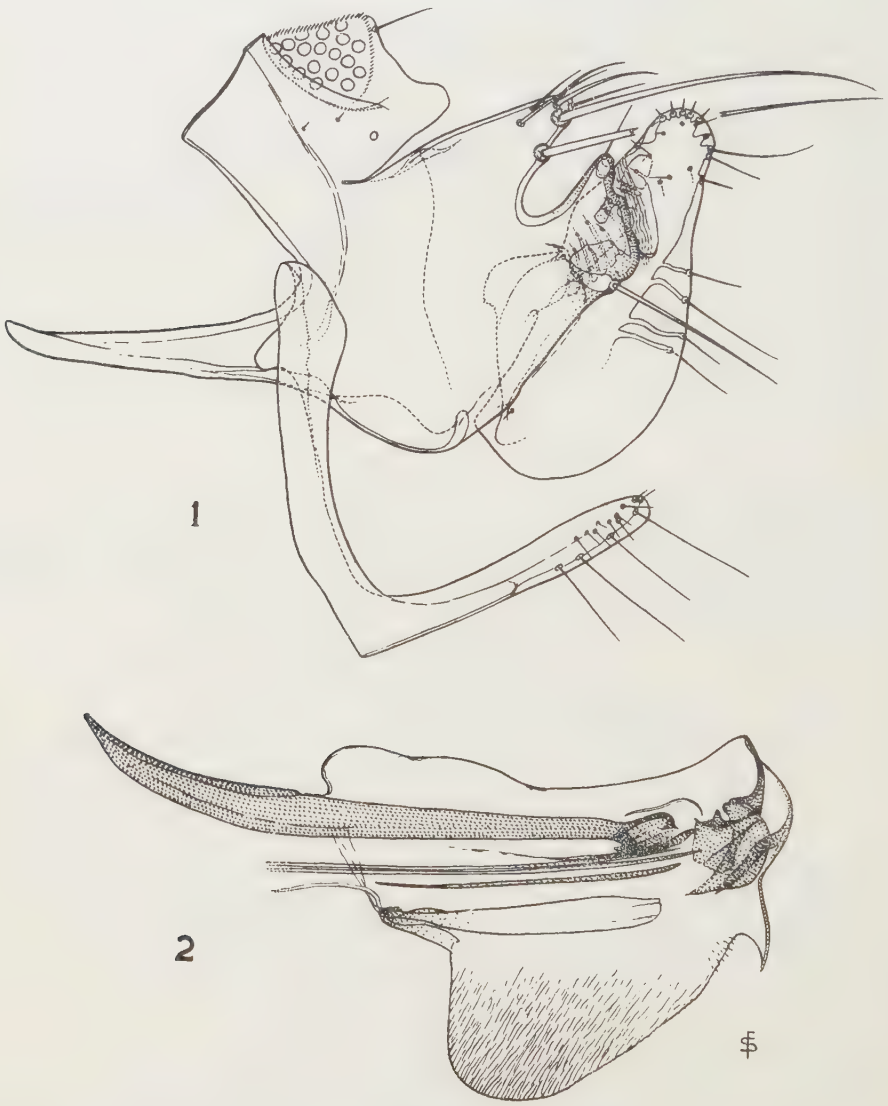
A common flea of *Apodemus sylvaticus* and apparently, to a lesser extent, of *Clethrionomys glareolus*, replacing the polytypic European species *Ctenophthalmus*

agyrtes in the south of France, the Pyrenees and northern Spain (Santander). A few specimens of this flea have been found on *Mus musculus*, *Pitymys pyrenaicus*, *Microtus arvalis* and *Eliomys quercinus* (accidental).

Ctenophthalmus (Ctenophthalmus) andorrensis sp. n. (Figs. 1–3)

Type material: Las Escaldas, from *Clethrionomys glareolus nazeri*, 5.vii.1950: ♂ holotype and 3 ♂ paratypes; from *Apodemus sylvaticus callipides*, 30.vi.1950: ♀ allotype and 2 ♀ paratypes; 2.vii.1950: 2 ♂, 1 ♀ paratypes; 4.vii.1950: 3 ♂ paratypes; 8.vii.1950: 1 ♀ paratype.

The new species is related to *Ctenophthalmus* (*Ctenophthalmus*) *agyrtes* and *C.* (*C.*) *nobilis*, and in a lesser degree to *C.* (*C.*) *apertus*: it appears to occupy a more or



Figs. 1, 2.—*Ctenophthalmus andorrensis* sp. n.: (1) clasper and sternum IX (holotype); (2) phallosome (paratype).

less intermediate position between the first two polytypic species and the third. While the clasper of the male resembles that of *C. agyrtes*, sternum IX and the phallosome are more of the type found in *C. apertus*. The female resembles that sex of several subspecies of *C. agyrtes* and is difficult to differentiate from the latter. *C. andorrensis* belongs to the group of species which contains *C. agyrtes*, *C. nobilis*, *C. arvernus*, *C. hispanicus* and *C. baeticus* ; all these are vicariating species.

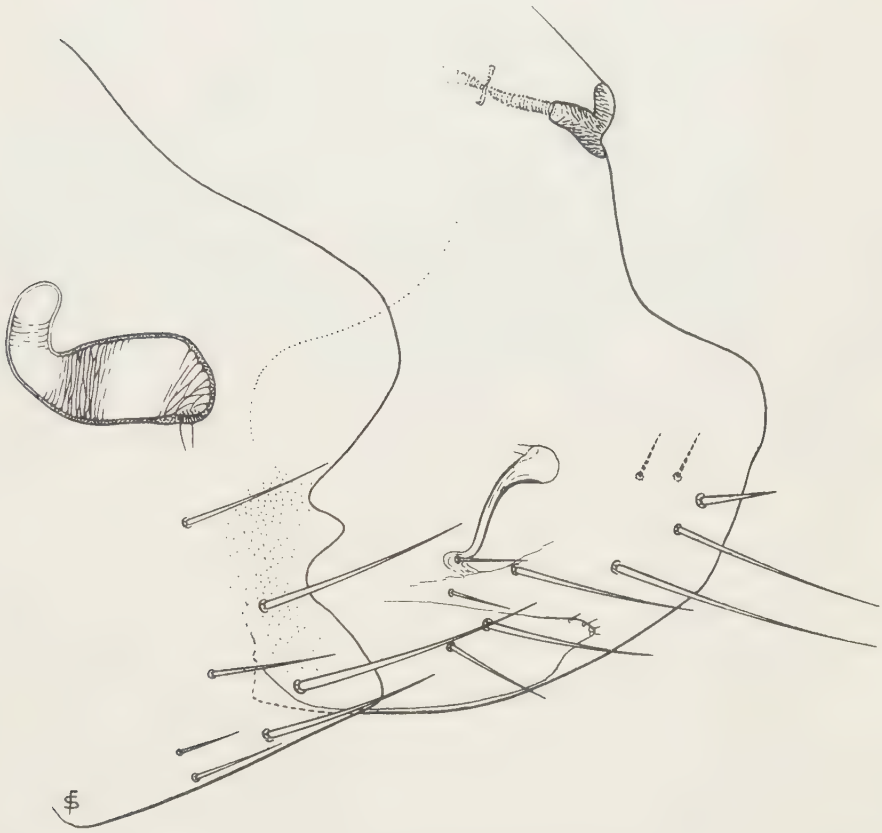


FIG. 3.—*Ctenophthalmus andorrensis* sp. n. Sternum VII, segment VIII and spermatheca of female (allotype).

Male (figs. 1, 2) : sternum VIII considerably smaller relatively than in related species, with a rounded posterior margin. Dorsal lobe of fixed process of clasper (fig. 1) triangular, with 2 long marginal setae and several short ones at and near the apex ; ventral lobe, separated from the dorsal by a deep, rather wide and rounded sinus, much broader than dorsal lobe and the upper half of its apical margin sinuate ; a strong acetabular seta present at ventral margin of ventral lobe. Movable process elongate pyriform, tapering gradually towards the broadly rounded apex; this process extending for just one-quarter of its length beyond tip of ventral lobe of fixed process. Apex of movable process with 5 slender sensilla ; the group of 4 setae placed in the middle of the posterior margin ; fovea elongate, very large, longitudinally striate. Manubrium narrow and straight, with a slightly upturned tip. Postsensilial seta short. Distal arm of sternum IX (fig. 1) very slender, of subequal width throughout, with 4 long and thin setae and a number of very small setae on its apical half. Phallosome (fig. 2) resembling that of *C. apertus* ; ventral lobes of aedeagus large but not turned upwards (in 2 specimens the tip of 1 of the 2 lobes is turned upwards, no doubt accidentally), with a densely striated surface and a minutely serrate margin.

Female (fig. 3) : posterior margin of sternum VII with a well-developed, rounded dorsal lobe, below which is a small lobe ; this shape is similar to that in a number of subspecies of *C. agyrtes*. Tergum VIII with 2 or 3 genital setae ; no setae above spiracular fossa. Sternum VIII broad. Bulga of spermatheca rather variable in width, sometimes narrower or wider than shown in figure 3.

Length : ♂, 2¼–2½ mm.; ♀, 2½–3 mm.

References

Dunnet, G. M., 1955, Records of small mammals and their fleas from Reinosa, Santander, Spain. *Ann. Mag. nat. Hist.* (12) **8** : 445–7, fig. 1.

Gil Collado, J., 1948, Las especies españolas de Afanipteros. *Eos, Madr.* **24** : 247–56, pl. XX.

Jordan, K., 1951, On *Leptopsylla taschenbergi* Wagner, 1898. *Ibid.*, Tomo extraord.: 19–26, figs. 1–5.

Peus, F., 1958, Flöhe aus dem Mittelmeergebiet (Ins., Siphonapt.). II. Griechenland. *Mitt. zool. Mus. Berl.* **34** : 135–71, figs. 1–29.

—— and Smit, F. G. A. M., 1957, Ueber die beiden Subspezies von *Hystrichopsylla talpae* (Curtis) (Ins., Siphonaptera). *Ibid.* **33** : 391–410, figs. 1–12, maps A, B.

Rosický, B., 1957, Results of geographical investigation of fleas in Czechoslovakia. *Čsl. parasitol.* **4** : 291–8, figs. 1–3.

Rothschild, N. C., 1911, Liste des Siphonaptera du Muséum d'Histoire Naturelle de Paris, accompagnée de descriptions des espèces nouvelles. *Ann. Sci. Nat., Zool.* (IX) **12** : 203–16, figs. 1–6.

Smit, F. G. A. M., 1957, Siphonaptera. *Handb. Ident. Brit. Ins.* **1** (16) : 1–94, figs. 1–200. R. ent. Soc. Lond.

FURTHER RECORDS OF EAST AFRICAN TERMITES—III*

By W. Victor Harris

(*Colonial Termite Research Unit, London*)

Termitidae

Odontotermes montanus sp. n. (Fig. 1)

Soldier.—Head red brown, darkening in alcohol; margin of frons and antennal pits dark brown; mandibles mainly brownish-black, becoming red-brown towards their bases; antennae pale brown; thorax and abdomen off-white with numerous yellow bristles.

Head elongate rectangular with flatly curved posterior and sides converging slightly towards the front; labrum roundly pointed, nearly as broad as long, with numerous long bristles; mandibles robust with sharply incurved tips; left mandible with a median tooth projecting at right angles to the inner margin, slightly beyond the mid-point, and the margin lightly serrated on the distal portion while the proximal portion is more distinctly irregular; right mandible with obtuse-angled tooth midway on the inner margin; antennae with 17 segments, even in width, segment III the shortest and IV slightly longer than V.

Pronotum saddle-shaped with large anterior lobes and distinct median anterior notch; posterior margin wide and broadly bi-lobed.

Only one size of soldier has been found so far.

	Holotype (mm.)	Range (11) (mm.)
Length of head and mandibles	4·00	3·30–4·01
Length of head	2·64	2·52–2·75
Width of head	1·96	1·80–2·12
Length of mandible	1·46	1·28–1·46
Width of pronotum	0·82	0·73–0·90
Length of pronotum	1·41	1·27–1·50
Length of hind tibia	1·60	1·57–1·65

Close to *Odontotermes tanganicus* Sjöst., to which species Sjöstedt ascribed specimens from Naivasha and Amboni in Kenya, earlier recorded as *O. transvaalensis* Sjöst. (1915, Termitidae, *Voyage Alluaud et Jeannel en Afrique Orientale*, Paris : 12.). This new species differs from *tanganicus* in its smaller size, the flatter sides of the head, the mandibles being proportionately longer and more slender, and in having the median tooth of the right mandible more conical.

Type locality.—Kenya: on the Kikuyu Escarpment, Nairobi-Naivasha road, in cedar forest, seventeen soldiers from type colony and eight soldiers from a second colony in the vicinity, 8.ii.1950 (*W. V. Harris*, No. 603).

Other records.—Kenya: Kedong Valley at foot of Kikuyu Escarpment, 23.iii.1950 (*W. V. H.*, No. 603/2); Muguga, nest exposed by roadworks, ix.1951 (*W. V. H.*); Nyeri, 15.vi.1950 (*W. V. H.*, No. 635); Thompson's Falls, 14.vi.1950 (*W. V. H.*, No. 633); Kaptagat, 1.iv.1952 (*W. V. H.*, No. 829).

Holotype, soldier in the British Museum (Nat. Hist.).

Biology.—*O. montanus* is a common ground-dwelling termite in the Kenya Highlands at elevations from 5500 to 8000 feet above sea level. It feeds on dead stumps and fallen branches in cedar and wattle forests, and on fence posts, building timbers and the like in cultivated areas. The nests are usually subterranean, but low mounds may develop from soil brought to the surface.

* Part I, 1951, *Proc. R. ent. Soc. Lond.* (B) **20**: 25–28; Part II 1954, *Ibid.* **23**: 127–37.

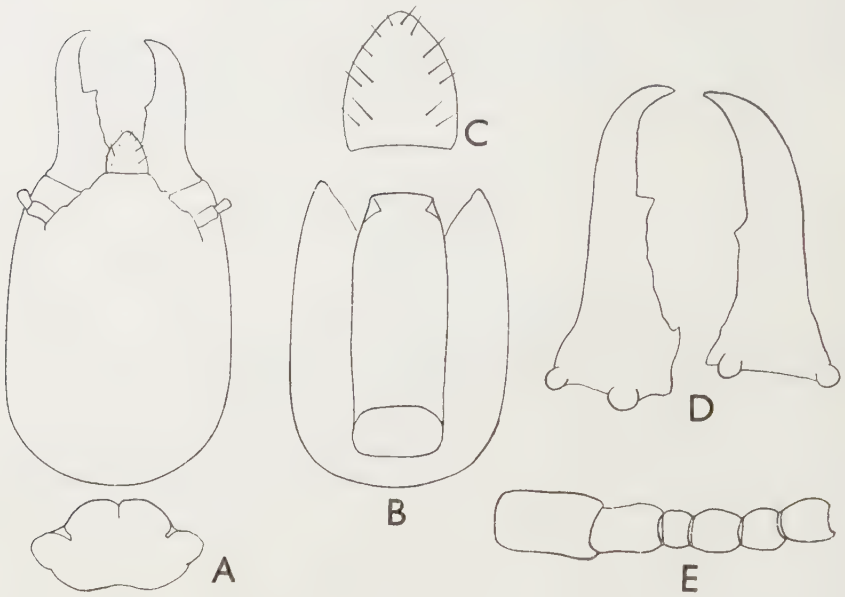


Fig. 1.—*Odontotermes montanus* sp. n. Soldier: (A) head and pronotum; (B) head from below; (C) labrum; (D) mandibles; (E) basal segments of antenna.

Odontotermes lacustris sp. n. (Fig. 2)

Imago, Female.—Head chestnut-brown with pale area around the fontanelle, and numerous scattered pale spots; baso-clypeus yellow with dark median line; mandibles yellow with brown tips. Pronotum yellow; legs yellow with brown spines; wings clouded brown. Abdomen with brown tergites and paler sternites.

Head almost semi-circular; baso-clypeus small and inflated; labrum square with flatly curved anterior margin; ocelli broadly oval, less than half their short diameter distant from the eyes; antennae with 19 segments, III, IV and V all short and broad and about equal in length, the terminal segment narrow-oval. Pronotum with small anterior lobes, flatly arcuate anterior margin, rounded corners and sides converging to rounded posterior with a median notch.

Wings long and broad with variable venation; fore wing with several branches from the distal part of the subcosta sloping towards the apex of the wing; medius and cubitus uniting a short distance from the scale, with 3 or 4 branches arising from the common vein; medius with numerous branches.

Male.—Generally as female, but prothorax smaller.

	Female holotype (mm.)	Male (mm.)
Width of head across eyes	2·73	2·77
Eye, diameter	0·77	0·77
Ocellus	0·41 × 0·32	0·36 × 0·27
Ocellus to eye	0·13	0·13
Width of pronotum	2·50	2·45
Length of pronotum	1·58	1·36
Length of hind tibia	3·00	3·10
Fore wing	35 × 9·5	34 × 9·5

Soldier.—Head varies from tan to dark brown in preserved material, shining; mandibles dark brown, paler near the base. Thorax, abdomen and legs creamy-white with fine, brown bristles.

Head oval, slightly narrower in front; labrum long, tongue-shaped; mandibles long and

slender with sharply incurved tips; left mandible with well-defined, forward-pointing tooth situated on inner margin one-third of the way from base to tip, and with edge between tooth and base slightly serrate; right mandible with smooth inner margin, and 2 vestigial teeth, one halfway and the other near the base; gula short and broad, with parallel sides and anterior corners cut off obliquely; antennae with 16 segments, robust, with II longer than any of the 4 succeeding segments, and IV smaller than III and V. (In one series, 4 soldiers had each one 15- and one 16-segmented antenna.)

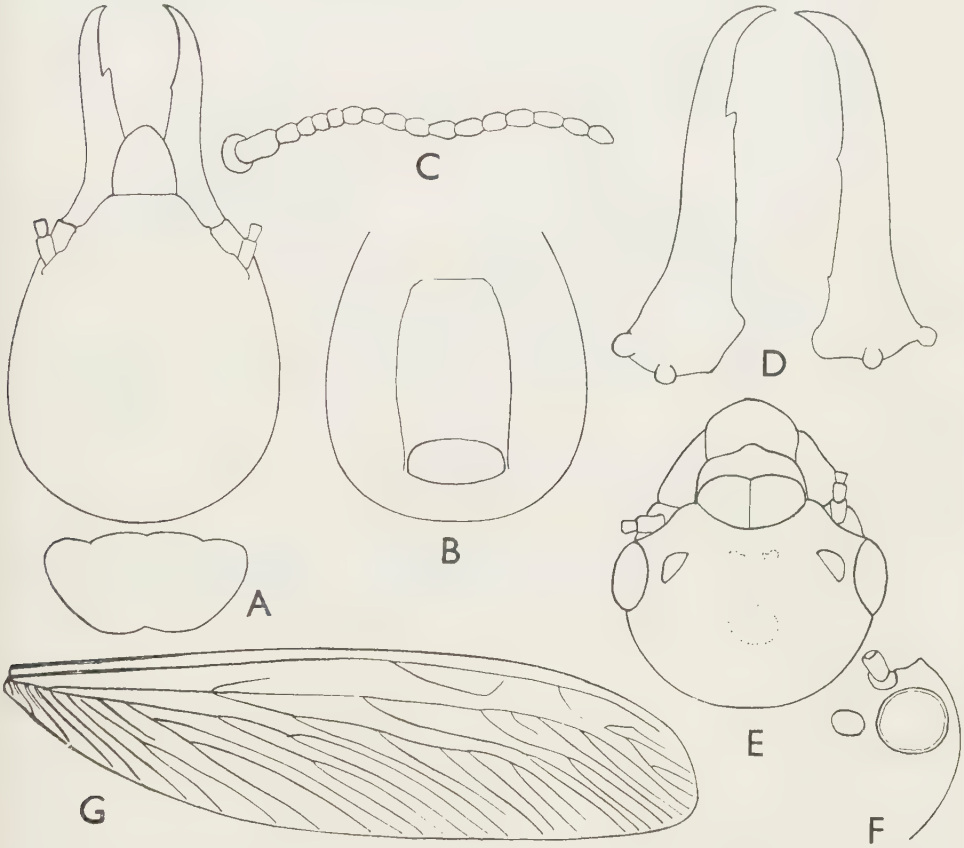


FIG. 2.—*Odontotermes lacustris* sp. n. A–D, Soldier: (A) head and pronotum; (B) head from below; (C) antenna; (D) mandibles. E–G, Imago: (E) head; (F) portion of side of head to show eye and ocellus; (G) fore wing.

Pronotum markedly saddle-shaped; anterior lobes large; anterior margin crenate; corners rounded and sides converging strongly to narrow, crenate posterior margin.

A marked discontinuity in the size range of the soldiers examined suggests the presence of two castes, though there appear to be no other differences.

	Morphotype (mm.)	Range (3)	Range (mm.) (11)
Length of head and mandibles	2·50	2·23–2·36	2·50–2·73
Length of head	1·50	1·36–1·40	1·50–1·64
Width of head	1·35	1·18–1·30	1·32–1·54
Length of left mandible	1·04	0·95–1·04	1·00–1·14
Width of pronotum	1·09	0·91–1·00	1·00–1·18
Length of pronotum	0·59	0·54	0·59–0·68
Length of hind tibia	1·32	1·09–1·28	1·28–1·36

The alates of this species are nearest to *O. latericius* (Hav.) among those with distal branches to the subcosta, but differ in having the ocelli much nearer the eyes, and the distance from the outer rim of the eye to the border of the head capsule less than the smaller diameter of the ocellus. Also the T-mark on the pronotum is rather indistinct, and the fore wing is longer. The soldiers differ from *O. latericius* and *O. vulgaris* (Hav.) in having more slender mandibles, with no distinct median tooth on the right one, and that on the left being in the middle of the inner edge. *O. interveniens* Sjöst. from Uele appears to have rather similar soldiers, but the alates as described are much smaller (fore wing 18 mm.) and the ocelli are more than their long diameter from the eyes.

Type locality.—Northern Rhodesia : Abercorn, three alates and sixteen soldiers, 8.xi.1948 (*P. E. Glover*).

Other records.—Nyasaland : Chisenga, 5.viii.1953 ; Ngabu, Lower Shire, 15.viii.1953 ; Lake Shirwa shore, 31.viii.1953 ; Namatulu Hill, Zomba Distr., 1.ix.1953 ; Lilongwe Plain, 7.ix.1953 ; Kota Kota, 17.ix.1953 ; Nchenachena, 30.ix.1953 (*W. A. Sands and W. Wilkinson*).

Holotype, alate female in the British Museum (Nat. Hist.).

Allotype, alate male in the British Museum (Nat. Hist.).

Morphotype, soldier in the British Museum (Nat. Hist.).

Biology.—O. lacustris is a ground-dwelling termite of the dry open woodlands of *Brachystegia* or *Copaifera*, or the more open short-grass with scattered *Acacia*.

Odontotermes flammifrons (Sjöstedt). (Fig. 3)

Termes flammifrons Sjöstedt, 1926, *Rev. Zool. afr.* **14** : 148–9.

Soldier.—Head ovate ; red-brown with a large irregular pale area on the frons from which 3 or 4 long narrow streaks taper towards the posterior (these pale streaks disappear after preservation for many years) ; mandibles black with pale base, slender with strongly incurved tips ;

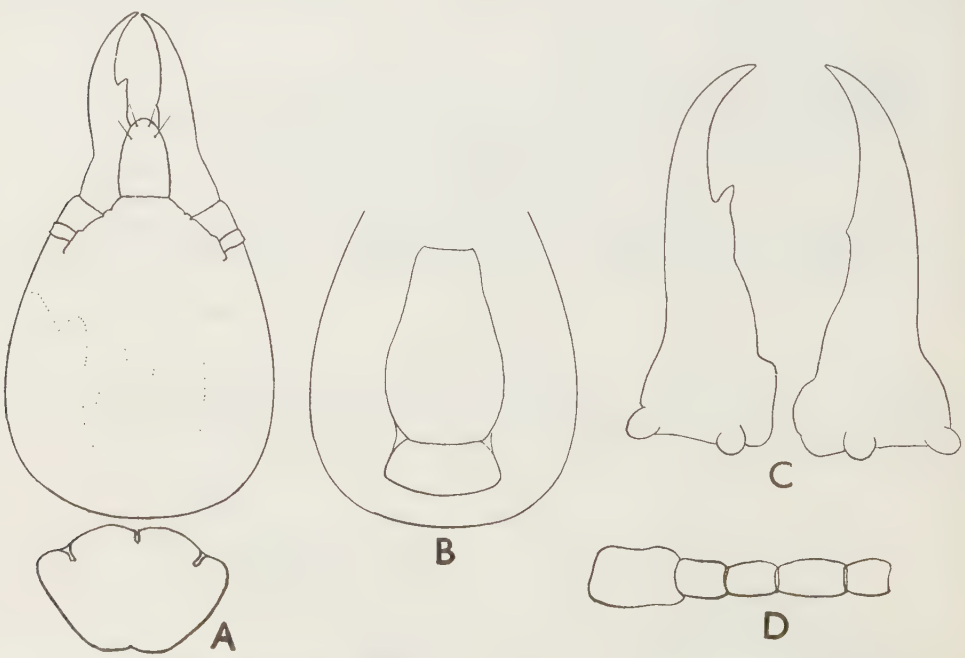


Fig. 3.—*Odontotermes flammifrons* (Sjöstedt). Soldier : (A) head and pronotum ; (B) head from below ; (C) mandibles ; (D) basal segments of antenna.

left mandible with a sharp, forward-directed tooth on inner margin, less than half-way from the apex, the margin from tooth to base being slightly sinuate ; right mandible with a vestigial median tooth ; labrum tongue-shaped, broad with a rounded tip ; gula broad, with sides strongly convergent towards anterior and posterior margin rounded ; antennae with 17 or 18 segments, in the former IV is slightly longer than II or III, and in the latter IV is the shortest segment.

Pronotum with short anterior lobes, though well defined, and anterior and posterior margins lightly emarginate. Thorax, abdomen and legs yellow.

	Range of 5 specimens from Abercorn (mm.)	Sjöstedt's measurements
Length of head and mandibles	4·18–4·32	3·75–4·00
Length of head	2·73–2·82	.
Width of head	2·32–2·41	2·00–2·15
Length of left mandible	1·59–1·64	1·55–1·65
Width of pronotum	0·82–1·00	.
Length of pronotum	1·73–1·77	.
Length of hind tibia	2·14–2·27	.

Distribution.—Previously recorded from the type locality, Congo Belge : Abimva, Haut Uele.

Northern Rhodesia : Abercorn, ii.1949 (*C. Petre*).

Nyasaland : Lilongwe, 9.ix.1953 ; Mzimba, 19.ix.1953 ; Luweya River, 21.ix.1953 (*W. A. Sands and W. Wilkinson*).

Biology.—*O. flammifrons* is a subterranean-nesting termite of the *Brachystegia* woodlands at elevations around 5000 feet above sea level and under rather moist conditions. The nest site is usually marked by several openings on the bare surface of the ground, these being sometimes surrounded by low turrets, particularly at the time of alate emergence. This is a species of *Odontotermes* which brings to the surface annually in the rains fragments of the " fungus combs ", on which develop small white edible mushrooms of the genus *Termitomyces*.

A NEW SPECIES OF *UDAYA* FROM MALAYA AND A DESCRIPTION OF THE EARLY STAGES OF *U. ARGYRURUS* (EDWARDS, 1934) (DIPTERA : CULICIDAE)

By W. W. Macdonald

(*Institute for Medical Research, Kuala Lumpur, Malaya*)

and

P. F. Mattingly

(*British Museum (Natural History)*)

When Edwards (1934) erected the new genus *Paraëdes* for two species of mosquito from South India and Assam (*P. barraudi* and *P.* (?) *argyrurus* respectively) it was clear to him that those two species were not in fact closely related. But since neither of them could be included in any known genus, and since there was only limited material (two males of *barraudi* and two females of *argyrurus*), it probably seemed best at that time not to create two new genera. However, when Thurman (1954) discovered the male of *argyrurus* in Thailand and found that the terminalia were very different from those of *barraudi*, it was obvious that the two species had to be separated. Thurman therefore erected a new subgenus, *Udaya*, for *argyrurus*. More recently, Mattingly (1957, 1958*b*) has concluded that it is preferable to treat *Udaya* as a distinct genus, while treating *Paraëdes* s.str. as a subgenus of *Aëdes*.

U. argyrurus has been known to occur in Ulu Gombak Forest Reserve, Malaya, some fifteen miles north of Kuala Lumpur, for some years, but only occasional females had been captured in catches of biting flies. The early stages have been unknown, but there are so many unusual features in the adults that those stages have assumed a reflected importance. It was therefore of great interest when, towards the end of 1957, a male and a female were reared from larvae collected from a fallen split bamboo in Ulu Gombak. A few days later in the same area, a female mosquito that looked at first glance to be *argyrurus* was caught in a sweep-net. A closer examination revealed that this female belonged to a new species. Not long afterwards a second female of the new species was captured by sweep-netting, so an attempt was made to get it to take a blood meal in the laboratory in the hope of obtaining an egg-batch. The mosquito would not bite, but very fortunately it laid seven eggs, presumably the remnants of an earlier batch, before it died a day or two later. From those eggs a small but valuable series of adult males and females was obtained together with their associated larval and pupal skins.

This paper describes the new species and the hitherto unknown early stages of *U. argyrurus*, and discusses the possible relationships of this interesting small group.

Udaya lucaris sp. n.

Adult Male

Head : dorsum with a central patch of flat, dark-bluish scales, flanked by a strip of silvery scales beyond which the scales become dark again ; ventrolaterally there is a patch of yellowish-white scales ; silvery-white scales separate the eyes and extend to the tori ; a few dark upright forked scales on the nape. Antennae plumose, the hairs flaccid and extended mainly dorsoventrally. Clypeus bare. Palpi dark, as long as or slightly longer than the proboscis, slender and with very few bristles.

Thorax : mesonotum uniformly covered with small dark brown scales ; acrostichal bristles absent, dorsocentrals well developed. Scutellar lobes each with a patch of broad dark brown

scales, the patches separated from one another by bare areas. Postnotum bare. Anterior pronotal lobes well separated, covered with flat silvery scales ; posterior pronotum bare. Three or 4 stout posterior pronotal setae and 2 or 3 postspiracular setae present. Spiracular and lower mesepimeral setae absent. Sternopleura with 1 large seta on posterior edge and 2 small ones above this ; ridge with 1 or none ; 1 or 2 very small setae below lower sternopleural scale patch. Paratergite with a large patch of silvery-white scales. Pleurae with 4 patches of silvery-white scales : on the propleura, lower sternopleura (above the mid-coxa), upper sternopleura, and upper mesepimeron respectively.

Legs : all femora yellowish below almost to tip, each with a small knee-spot of silvery scales ; tibiae all dark ; fore and mid-tarsi with white scales, not forming a band, at base of I, sometimes a few pale scales at base of II, otherwise dark ; hind tarsus with white scales, not forming a band, at base of I, clear white basal bands on II and III, segment IV all white except for a narrow apical

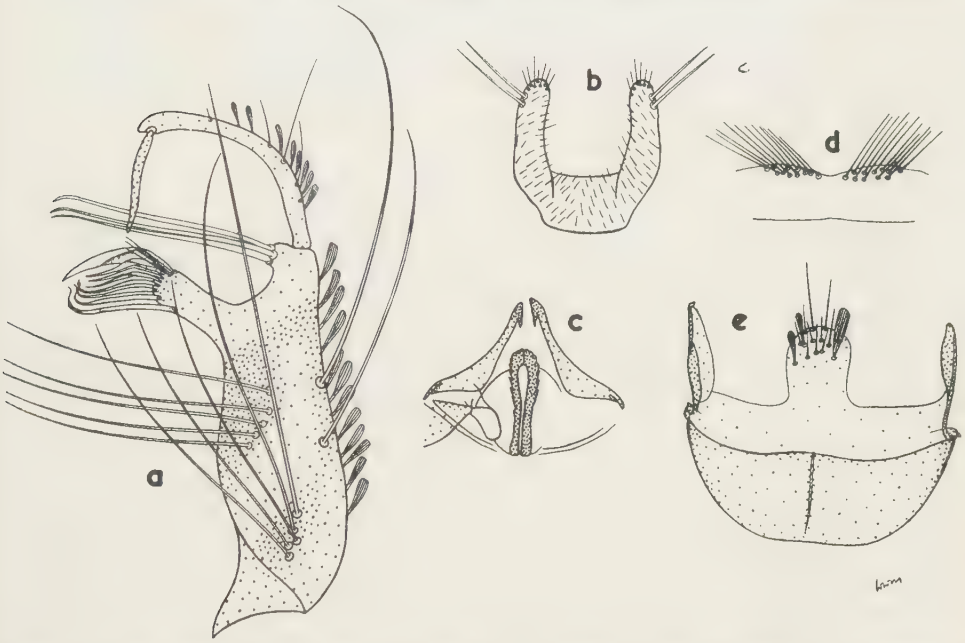


FIG. 1.—*Udaya lucaris* sp. n. male terminalia : (*a*) basistyle and dististyle ; (*b*) claspette (*c*) tenth sternite and phallosome ; (*d*) ninth tergite ; (*e*) ninth sternite.

black band, V all dark. Fore claws large and unequal, the larger claw toothed ; mid and hind claws small, equal and simple.

Wings : squamal fringe present ; in the available specimens it comprises only 6 or 7 fine hairs, usually located in 2 groups. Alula with a short fringe of quite broad scales and several broad decumbent scales in addition. Anterior fork cell about 1·5 times the length of its stem. Plume scales narrow.

Abdomen : tergites mainly dark scaled ; lateral lobes of tergite I with silvery-white scales, II–VII each with a conspicuous patch of silvery-white scales laterally, VIII with a pair of submedian silvery-white patches. Sternites I–V covered with yellowish-white scales, VI and VII similar except for a narrow apical dark band, VIII dark but for a narrow basal band.

Terminalia (fig. 1) : basistyle 3·5 times as long as wide with a prominent subapical lobe, and a small apical lobe near the junction with the dististyle. The subapical lobe bears a group of setae distally, the largest of which is broad and flattened, 3 or 4 smaller ones are broad and flat medially then taper to a point, and proximally are about 4 long setae of more uniform thickness ; arising near the base of the largest seta are 3 straight, slender, sharply-pointed setae about half its length. The apical lobe bears 2–3 stout setae rather longer than the dististyle. The basistyle itself has a group of 5 or 6 setae situated dorsally near the base, a row of 4 or 5 others about the

middle on the inner side, and 2 very long setae arising near the outer margin. Dististyle slightly more than half as long as the basistyle, curved, and bearing near the apex a slightly twisted long claw which is about half as long as the dististyle ; on its basal half the dististyle bears some scattered scales and small setae and also some quite large setae. Claspette (fig. 1*b*) small, pilose, and bearing a number of short, slender setae and two long stout setae near the apex. Tenth sternite and phallosome as in figure 1*c*. Ninth sternite (fig. 1*e*) wider than long, base rounded, with a median apical lobe which bears a few scales and scattered setae. Ninth tergite (fig. 1*d*) concave apically with patches of numerous outwardly directed setae.

Adult Female

In general appearance fairly similar to the male, differing as follows : antennae not plumose ; palps about one-fourth the length of the proboscis ; fore and mid tarsi with a clear patch of white scales at the base of segments I and II, not forming a band, and a few white scales at the base of III ; hind tarsus as in male ; fore, mid and hind tarsal claws simple and equal ; tergites II–VII with a narrow basal band, yellowish in colour ; on tergite VIII the paired white patches have fused to form a single median patch of silvery scales ; wings rather more densely scaled than in the male.

Pupa

Cephalothorax : trumpet 3·2–3·9 times as long as broad. Setae 1–9 all single ; seta 10 with 1–3 branches ; setae 11 and 12 single.

Abdomen : chaetotaxy as shown in figure 2*a*. The nomenclature follows that of Knight and Chamberlain (1948), as modified by Belkin (1952, 1953). Float hairs with relatively few, stout, secondary branches which are smooth for most of their length and frayed only towards the tip as in some *Eretmapodites*. Seta 7 on segment VII stout, dark, single or bifid, situated anterior to seta 6 which is shorter and much more slender and delicate. Seta 7 on segment VIII stout, dark, bifid. Paddle with delicate fringe on both borders, the mid-rib very poorly developed, almost invisible. Apical seta simple or frayed distally, arising well to one side of tip of mid-rib.

Larva

Head : seta 1 (clypeal spine) single, long and tapering ; seta 4 (seta *d*) with 3–7 branches ; seta 5 (seta C) single ; seta 6 (seta B) bifid or trifid ; these setae all very much anterior to seta 7 ; seta 7 (seta A) very long and single ; seta 8 single or bifid ; seta 9 single ; seta 10 single or bifid ; seta 11 with three or four branches ; seta 12 long and single ; seta 13 single ; seta 14 stout, with 2–4 branches ; seta 15 single. Inner mouth-brush setae strongly pectinate. Mentum dark brown, with a central tooth and 9–12 laterals, the outer 2 set slightly apart from the others. Antenna smooth, slightly curved, 8·6–10·2 times as long as broad ; antennal hair bifid, inserted just beyond the middle of the shaft.

Abdomen : with lateral setae arising from well developed, lightly sclerotised papillae. Segment VIII (fig. 3*a*) : seta 1 bifid or trifid ; seta 2 single ; seta 3 bifid or trifid ; seta 4 single ; seta 5 with 2–4 branches. Comb a short row of 3–5 sharply pointed teeth, with a stout median denticle, which is occasionally split, and coarse basal fringe. Siphon short and broad ; in the slide preparations the siphon is flattened and in each case the width is slightly greater than the length ; siphonal hair with 3–4 branches and inserted slightly before half way. Pecten reduced to 1–4 teeth, each finely toothed along the distal margin. Siphon 1·2–1·4 times the length of the saddle. Anal segment (fig. 3*a*) : saddle incomplete ventrally with no spicules on the apical margin ; seta 1 (lateral seta) single, very long and prominent ; seta 2 (upper caudal seta) with 4–5 branches ; seta 3 (lower caudal setal with 2–4 branches ; seta 4 (ventral brush) with eight tufts, each of 2–6 stout, simple branches, their bases narrow.

Types.—Holotype ♂, No. 0443/6, Ulu Gombak, Selangor, 23.xii.1957, allotype ♀, No. 0443/2 and 1 paratype ♂ and 1 paratype ♀, with same data, all with associated pupal and larval skins and reared from the same egg-batch ; also 1 paratype ♀, No. 0370, caught in sweep net at Ulu Gombak, 15.x.1957 and one paratype set of unassociated larval and pupal skins. All these are in the British Museum (Natural History). A paratype, of each sex, with associated skins, will be presented to the U.S. National Museum.

Type locality.—Malaya : Selangor, Ulu Gombak Forest Reserve.

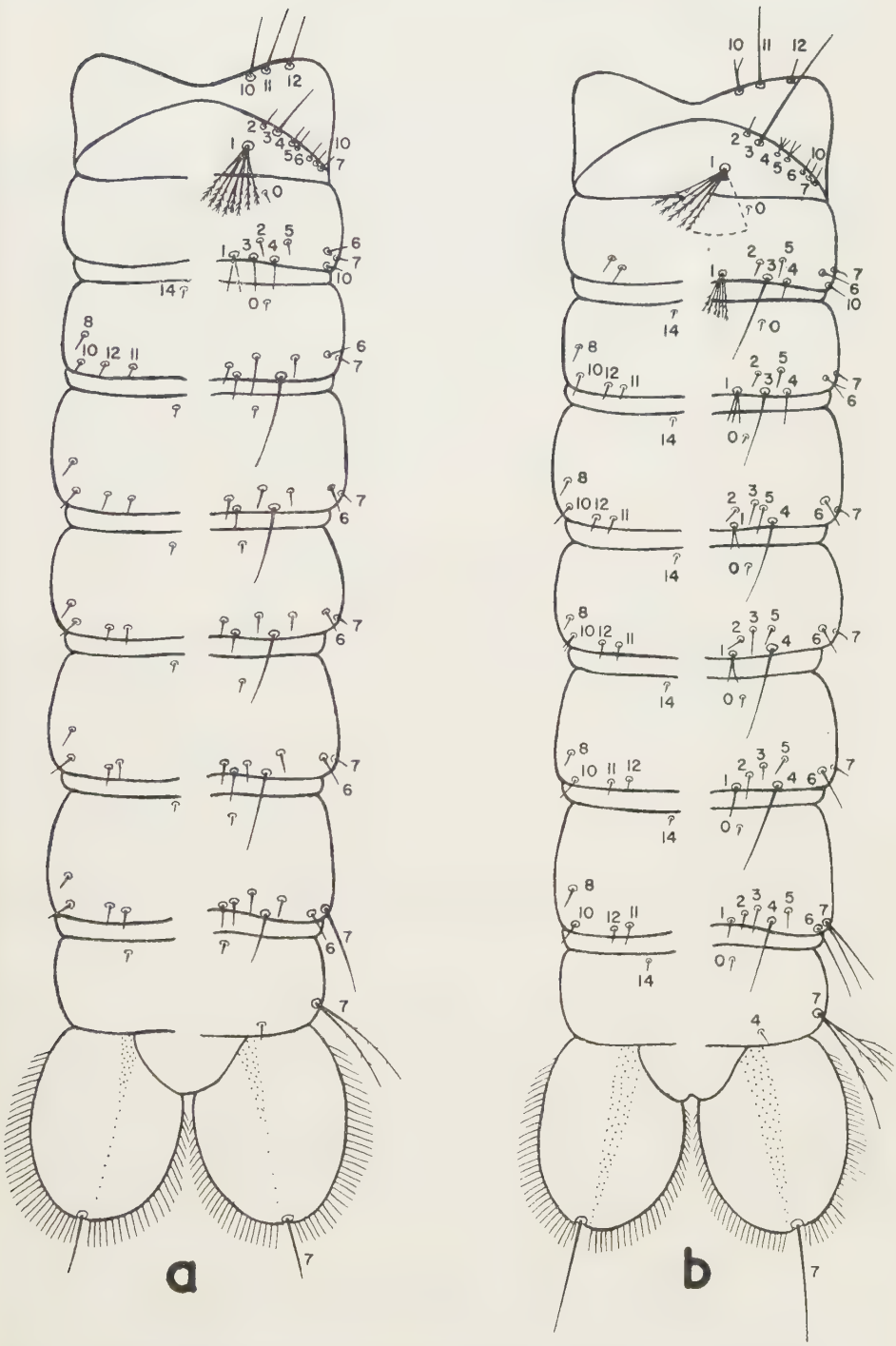


FIG. 2.—Pupal chaetotaxy of (*a*) *Udaya lucaris* sp. n. and (*b*) *Udaya argyrurus* (Edwards).

Since the generic name *Udaya* was raised in honour of Dr. Udaya Sandhinand of Thailand by Thurman (1954), it is being accorded male status, and the specific trivial names are treated accordingly.

Udaya argyrurus (Edwards, 1934)

LARVA

Head : seta 1 (clypeal spine) single, long and tapering ; seta 4 (seta *d*) bifid or trifid ; seta 5 (seta C) single ; seta 6 (seta B) bifid ; seta 7 (seta A) long and single, the longest head seta ; seta 8 bifid ; seta 9 with 2–4 branches ; seta 10 single or bifid ; seta 11 with 4–6 branches ; seta 12 prominent, bifid or trifid ; seta 13 small and bifid ; seta 14 long and single ; seta 15 smaller and single. Mentum as in *lucaris*. Antenna smooth, slightly curved, 10·2 times as long as broad ; antennal hair single or bifid, inserted just beyond the middle of the shaft.

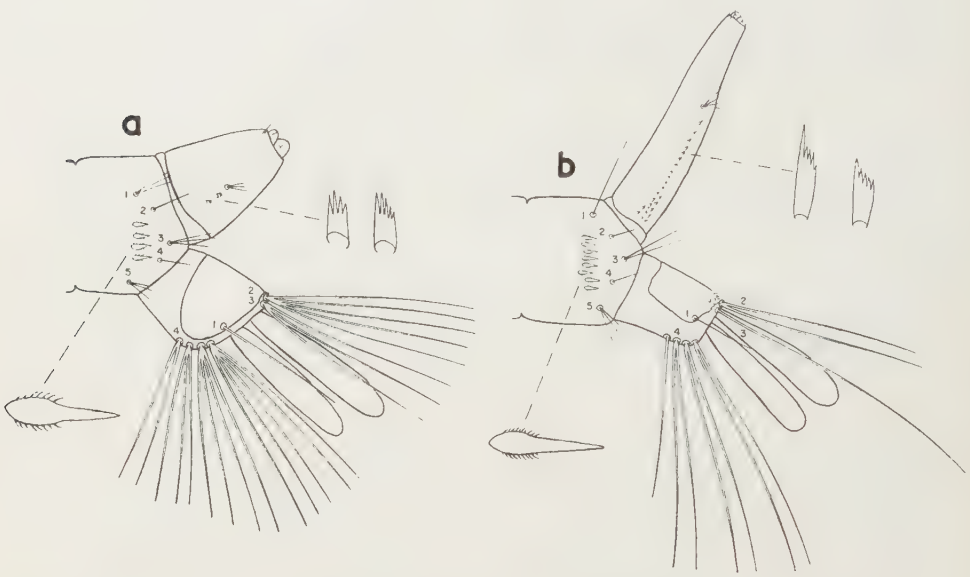


FIG. 3.—Abdominal segment VIII and anal segment of the larvae of (*a*) *Udaya lucaris* sp. n. and (*b*) *Udaya argyrurus* (Edwards). ½

Abdomen : papillae at bases of lateral setae well developed only on first 3 segments. Segment VIII (fig. 3*b*) : seta 1 long and single ; seta 2 small and single ; seta 3 bifid or trifid ; seta 4 small and single ; seta 5 bifid or trifid. Comb a row of 8–10 stout, sharply pointed teeth, each with a fine basal fringe. Siphon 4·1–4·7 times as long as its breadth at base ; siphonal hair with 3–6 branches and inserted slightly before half way. Pecten of 22–33 teeth set in an irregular line, not reaching the siphonal hair. Siphon 2·9–3·2 times the length of the saddle. Anal segment (fig. 3*b*) : saddle incomplete ventrally, with a patch of comb-like spicules apicodorsally ; seta 1 (lateral seta) long and single ; seta 2 (upper caudal seta) bifid ; seta 3 (lower caudal seta) single ; seta 4 (ventral brush) of 8 tufts, mostly bifid, the proximal tufts sometimes single.

PUPA

Cephalothorax : trumpet 5·7–6·0 times as long as broad. Seta 1 single ; seta 2 bifid ; setae 3–7 single ; seta 8 single or bifid ; seta 9 single ; seta 10 bifid ; seta 11 single, long and stout ; seta 12 single.

Abdomen : chaetotaxy as shown in figure 2*b*. Float hairs entirely devoid of secondary branching, the branches frayed or plumose on about the distal half. Seta 7 on segments VII and VIII much as in *U. lucaris*. Seta 6 on segment VII stout, dark, single, as long as or almost as long as seta 7. Apical paddle seta much longer than in *U. lucaris*.

The larval and pupal skins on which the description is based are in the British Museum (Natural History) together with the associated adults.

Differences between U. lucaris *and* U. argyrurus.

The differences between the larvae and pupae of *lucaris* and *argyrurus* are easily seen in figures 2 and 3. No further mention of them is therefore required. There are six characters by which the adults of two of the species might be separated.

(1) The thorax of *argyrurus* is very compressed laterally. This is quite marked, and it is surprising that neither Edwards (1934) nor Thurman (1954) commented on this feature. Recently it has been suggested (Mattingly, 1958*b*) that *argyrurus* might breed in the internodes of bamboos, and may enter the bamboo through very small holes. It is suggested also that the lateral compression of the thorax is an adaptation to this kind of breeding-place. Although the only two larval collections of *argyrurus* have come from fallen split bamboo, it may well be that the above suggestion is a sound one. It is hoped that current investigations on the mosquito fauna of bamboos will clarify the matter.

(2) In *argyrurus* the male palps have a dorsal strip of white scales on segment II and a clear basal band of white scales on segment III : in *lucaris* the male palps are entirely dark.

(3) In *argyrurus* the patch of silvery-white scales on the paratergite is longitudinal in shape and extends forwards over and beyond the anterior spiracle : in *lucaris* the patch is ovoid and only reaches the posterior lip of the spiracle.

(4) The fore and mid-tarsi of *argyrurus* have a prominent patch of white scales at the base of segments I and II in the male, and I, II and III in the female : in *lucaris* only segments I in the male, and I and II in the female, have such scales.

(5) Specimens of *U. argyrurus* available for examination from Malaya and Thailand appear to lack a squamal fringe entirely. One cotype of this species, however, has a single, long, narrow fringe scale and it seems probable that others may have been lost as a result of rubbing, associated perhaps with the great lateral compression of the thorax (Mattingly, 1958*b*).

(6) Final differences between *lucaris* and *argyrurus* are found in the form of the male terminalia. These differences are very striking, as comparison of figure 1 of this paper with the figure of *argyrurus* by Thurman (1954 : 85) will show. The terminalia of a male *argyrurus* from Ulu Gombak have been examined and found to be as described and figured by Thurman.

A Note on the Affinities of Udaya

Adults of the genus *Udaya* recall those of *Eretmapodites* Theobald in general facies as well as in more detailed external characters (*see* keys to genera in Mattingly, 1957, 1958*a*, and 1959). The male terminalia are, however, more as in *Aëdes*. The genus *Udaya* thus seems to be annectent, and this impression is strengthened by an examination of the early stages, especially the pupae with their characteristic float hairs and the larva of *U. lucaris* with its well-developed papillae at the bases of the lateral abdominal setae.

References

Belkin, J. N., 1952, The homology of the chaetotaxy of immature mosquitoes and a revised nomenclature for the chaetotaxy of the pupa (Diptera, Culicidae). *Proc. ent. Soc. Wash.* **54** : 115–30.

—— 1953, Corrected interpretations of some elements of the abdominal chaetotaxy of the mosquito larva and pupa (Diptera, Culicidae). *Ibid.* **55** : 318–24.

Edwards, F. W., 1934, Further descriptions of Indian Culicini. *In* Appendix (pp. 441–53) to Barraud, P. J., *The Fauna of British India. Diptera*, 5 (*Culicidae* : *Megarhinini* and *Culicini*). London.

Knight, K. L., and Chamberlain, R. W., 1948, A new nomenclature for the chaetotaxy of the mosquito pupa, based on a comparative study of the genera (Diptera : Culicidae). *Proc. helm. Soc. Wash.* **15** : 1–10.

Mattingly, P. F., 1957, *The culicine mosquitoes of the Indomalayan area. Part II. Genus* Heizmannia *Ludlow*. London : Brit. Mus. (Nat. Hist.).

—— 1958*a*, *Ibid.*, *Part III*, *Genus* Aëdes *Meigen*, *subgenera* Paraëdes *Edwards*, Rhinoskusea *Edwards and* Cancraëdes *Edwards*.

—— 1958*b*, A revision of *Paraëdes* Edwards and *Cancraëdes* Edwards (Diptera : Culicidae). *Proc. R. ent. Soc. Lond.* (B) **27** : 76–83.

—— 1959, *The culicine mosquitoes of the Indomalayan area. Part IV. Genus* Aëdes *Meigen*, *subgenera* Skusea *Theobald*, Diceromyia *Theobald*, Geoskusea *Edwards and* Christophersiomyia *Barraud*. London : Brit. Mus. (Nat. Hist.).

Thurman, D. C., Jr., 1954, The discovery of *Paraëdes* (*Udaya*) *argyrurus* Edwards, 1934, in Thailand (Diptera : Culicidae). *Mosquito News* **14** : 83–86.

Book Notice.

Pacific Insects. Vol. 1, pt. 1. Pp. 172. Entomology Department, Bernice P. Bishop Museum, Honolulu, Hawaii, U.S.A., 1959.

This is the first issue of a new journal published by the Entomology Department of the Bernice P. Bishop Museum. The journal is intended for the publication of the results of the programme '*Zoogeography and Evolution of Pacific Insects*', which is sponsored by the Entomology Department of the Bernice P. Bishop Museum. This programme is designed to co-ordinate systematic and zoogeographic work on insects of the Pacific area. Quarterly issues are planned, making an annual volume of at least 400 pages. The cost per volume will be £1 15s. 6d. ($5). The journal will be devoted primarily to the publication of monographs or zoogeographical papers on insects and other terrestrial Anthropods of the Pacific area, including eastern Asia, Australia and Antarctica.

Part 1 includes a monograph on *Trithecoides*, a new subgenus of *Culicoides* (Diptera), by W. W. Wirth and A. A. Hubert, a revision of the Melanesian ants of the tribe Cerapachynini by E. O. Wilson and a review of the Longicorn beetles of the subfamilies Prioninae, Disteniinae, Lepturinae and Cerambycinae from New Guinea.

PUBLICATIONS

The principal Publications of the Royal Entomological Society are *Transactions* and *Proceedings*.

The **Transactions** form an annual volume, each paper in the volume being issued as a separate part. The parts are issued irregularly throughout the year.

The **Proceedings** are issued in three series:

Series A. General Entomology
Series B. Taxonomy
Series C. Journal of Meetings

Series A and B are issued in twelve parts, forming an annual volume of approximately 240 pages each.

The following information is supplied for the guidance of authors wishing to submit papers for publication in any of the Society's journals.

TRANSACTIONS

Papers offered for publication in the *Transactions* are considered by the Publication Committee of the Society which meets usually in the months of May and November. In order that papers may be considered at these meetings it is necessary for the manuscript and drawings for illustrations to be in the hands of the Registrar as early as possible. Papers received *after* 1st April and 1st October cannot be considered at the meeting immediately following.

The Society is prepared to undertake the provision of a reasonable number of figures, in line or half-tone. Colour work is accepted only by special arrangement.

Papers of less than eight printed pages (approximately 5,000 words) will not normally be accepted for the *Transactions* and papers by authors who are not Fellows of the Society must be communicated by a Fellow.

PROCEEDINGS SERIES A AND SERIES B

Papers submitted for publication in either *Series A* or *Series B* of the *Proceeedings* are considered by the Editor and may be submitted at any time. Papers by authors who are not Fellows of the Society may be accepted if they are communicated by a Fellow.

Line blocks will be provided by the Society. Half-tone and colour work are accepted only by special arrangement and the author may be required to pay for the blocks.

PROCEEDINGS SERIES C

Series C is issued before every General Meeting. It contains abstracts of communications to be made, together with the titles of papers accepted for publication in the *Transactions*.

The annual subscription to *Series A, General Entomology*, is £2 8*s*. 0*d*.; *Series B, Taxonomy*, £2 8*s*. 0*d*.; and *Series C, Journal of Meetings*, £1 0*s*. 0*d*.

As from January, 1936, the journal *Stylops* is continued as *Proceedings Series B, Taxonomy*. Copies of volumes 1–4 are available at £1 16*s*. 0*d*. each, post free.

GENERAL

The original drawings for all figures must be supplied by authors and must be drawn to a scale which will permit of their reduction, singly or after grouping, to an area of dimensions not exceeding 7 by 4½ in.

A uniform method is adopted for the citation of bibliographical references in the Society's publications as follows:

SMITH, A., 1936, New species of Coccidae. *Proc. R. ent. Soc. Lond.* (B) **6**: 301–6, pl. 1.

—— 1936, New species of Coccidae. *Trans. R. ent. Soc. Lond.* 84: 901–36.

Titles of periodicals cited are to be abbreviated in the manner indicated in the *World List of Scientific Periodicals, 3rd edition*, 1952.

Authors are entitled to receive 25 copies of their papers free of charge and may purchase additional copies provided that request be made before publication.

Papers offered for publication should be sent to the Registrar, Royal Entomological Society of London, at 41, *Queen's Gate, London, S.W.*7, and must be typewritten on one side of the paper only, with double spacing. **All papers in the Transactions must be provided with a summary.**

All the Society's publications are copyright.

MEETINGS

TO BE HELD IN THE SOCIETY'S ROOMS
41, Queen's Gate, S.W.7

1960

Wednesday, March 2
„ April 6
„ May 4
„ June 1

THE ROYAL ENTOMOLOGICAL SOCIETY OF LONDON

The Fellowship and Fees

Fellows pay an Admission Fee of £2 2*s*. The Annual Contribution, £3 3*s*., is due on the first day of January in each year, and is payable in advance. Fellows under the age of 25 years on the date of election are exempt from the payment of the Entrance Fee.

Fees should be paid to the Registrar, at 41, Queen's Gate, S.W.7.

Fellows desiring to pay their Annual Contribution through their Bankers may obtain an official form of banker's order by applying to the Registrar.

Fellows whose Contributions for the current year have been paid are entitled to receive the *Transactions* and *Proceedings* of the Society free of charge. Further copies may be purchased at reduced prices by applying to the Registrar.

Forms of application for Fellowship, copies of the Bye-Laws and the List of Fellows may be obtained from the Registrar.

Meetings and Exhibitions

Fellows and others wishing to make a communication to a General Meeting of the Society are requested to send in their names, the title of their exhibit, and a short abstract of their remarks, to the Hon. Secretary fourteen days before the meeting at which it is proposed to make the communication. Should it be desirable to publish a fuller account of the communication the manuscript may be submitted for publication in *Proceedings Series A* or *Series B*.

Fellows resident abroad, or otherwise unable to attend meetings are reminded that notes or observations sent to the Hon. Secretary may be communicated to a General Meeting on their behalf.

PRINTED FOR THE SOCIETY BY ADLARD AND SON, LTD., BARTHOLOMEW PRESS, DORKING